

Annual Report 2022-23



futurearth





Future Earth Annual Report 2022-23

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This annual report covers the period from 1 April 2022 to 31 March 2023

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Directors' Note

In 2022-23, complex and interconnected global risks like the energy crisis, food insecurity, geopolitical crises, and impacts from extreme weather deepened. In the face of mounting environmental and social change, Future Earth harnesses the collective power of scientists to design solutions and foster a deeper understanding of the mutual dependence between people, nature, and the planet through transdisciplinary research and innovation.

As the pandemic waned in 2022, our community was able to gather more in person. The first fully hybrid sustainability conference, Sustainability Research & Innovation Congress 2022 (SRI2022) was held in Pretoria, South Africa and online with satellite events in Asia and Oceania. Representatives from our community met in Paris for the first Future Earth Assembly to coordinate our research agenda which included new implementations to enhance and increase collaboration, capacity building, and funding calls. The Assembly included an Open Science Conference, in which scientists from our community shared key recent research outcomes.

As we navigate the ever-changing landscape of sustainability challenges, we have continued to prioritize inclusivity, equity, and diversity. Our dedication to amplifying all voices and ensuring equitable representation has enhanced the effectiveness and relevance of our work, making it truly impactful for communities worldwide. Throughout the year, we continued to expand our global reach, establishing new partnerships and strengthening existing ones, including the addition of two National Committees in Thailand and South Africa. These networks enable us to help inform global sustainability policies at local, national, and international levels.

The breadth and depth of research across Future Earth's networks is substantial and nearly immeasurable. A paper from the output of the Earth Commission and published in the journal *Science*, "Exceeding 1.5C global warming could trigger multiple climate tipping points," was the second-most covered climate paper by the media in 2022 and is referenced in five policy documents, according to Altmetric. Our 27 Global Research Networks continued to bring together innovators from all sectors to address the world's most pressing sustainability challenges and generate knowledge relevant to decision-makers. You can read their highlights throughout the report.

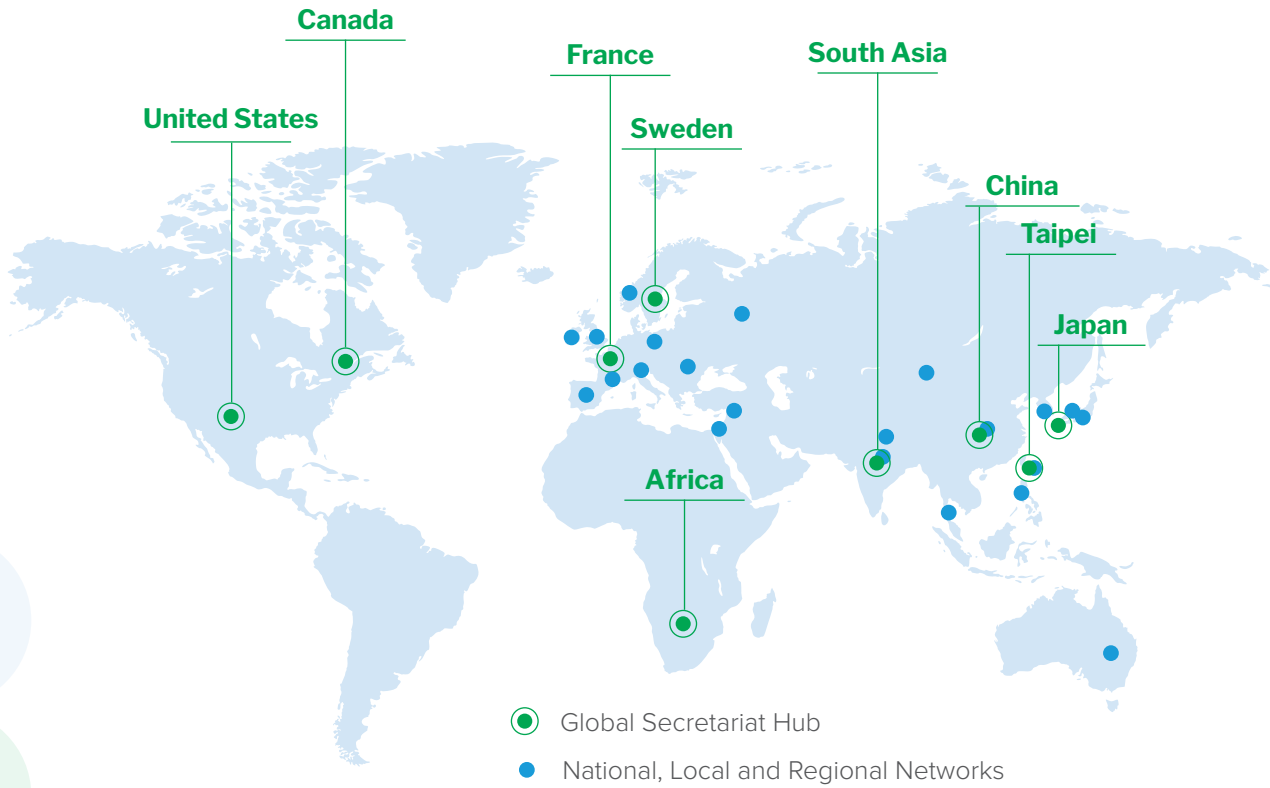
Future Earth researchers engaged with international science-policy processes throughout the year. At Stockholm+50, experts convened by Future Earth, the International Science Council, and the Stockholm Environment Institute renewed the call for action in an open letter to the world, fifty years after the UN Environment Summit. At COP27, Future Earth and partners released the latest 10 New Insights in Climate Science with the Executive Secretary of the UNFCCC. Biodiversity experts contributed to actionable solutions aimed at supporting negotiations at COP15, where nations adopted the long-awaited Global Biodiversity Framework, championed in a global call from scientists co-convened by the Earth Commission.

Digital technologies offer huge potential to contribute to the achievement of the Sustainable Development Goals. They can also pose harm to societies and the environment. Future Earth and *Sustainability in the Digital Age* contributed to the United Nations Global Digital Compact leading to the Summit of the Future in 2024. The input stresses that interrelated issues of climate change and biodiversity conservation must be a central element in the Compact.

We invite you to further explore our progress, achievements, and the impact we have made in addressing some of the most pressing environmental and societal challenges of our time as we work to shape a brighter future for our planet.

Signed,
2022 Global Hub Directors, Future Earth

A Global Network of Researchers and Innovators



09 Global Secretariat Hubs

27 Global Research Networks

20 National, Local, and Regional Networks



Our Mission:

Future Earth's mission is to advance research in support of transformations to global sustainability.



Our Vision:

The vision of Future Earth is of a sustainable and equitable world for all, where societal decisions are informed by openly-accessible and shared knowledge.





Future Earth Community

The strength of Future Earth lies within the work of the community comprising 27 Global Research Networks, and National and Regional Networks (National Committees and Structures, Regional Committees and Offices), as well as the Early Career Network. These networks represent academics, policy-makers, independent scholars, and students, all working across sectors and disciplines. They play a critical role in defining and advancing research and solutions in Earth system science and its component sub-systems and their nexus (land, ocean, food, energy, water, etc.), including human societies and health. The secretariat works to connect the networks and drives synthesis and engagement across the different networks, including communications products and links to policy communities at a global level.

In 2022, with the world opening up to in-person meetings, the Future Earth community has re-engaged through face-to-face meetings in order to accelerate collaborative innovative research. These collaborations often took form in a hybrid manner, which has enabled broader participation than pre-pandemic, maximizing the opportunities for inclusivity and diversity, a core principle of Future Earth.

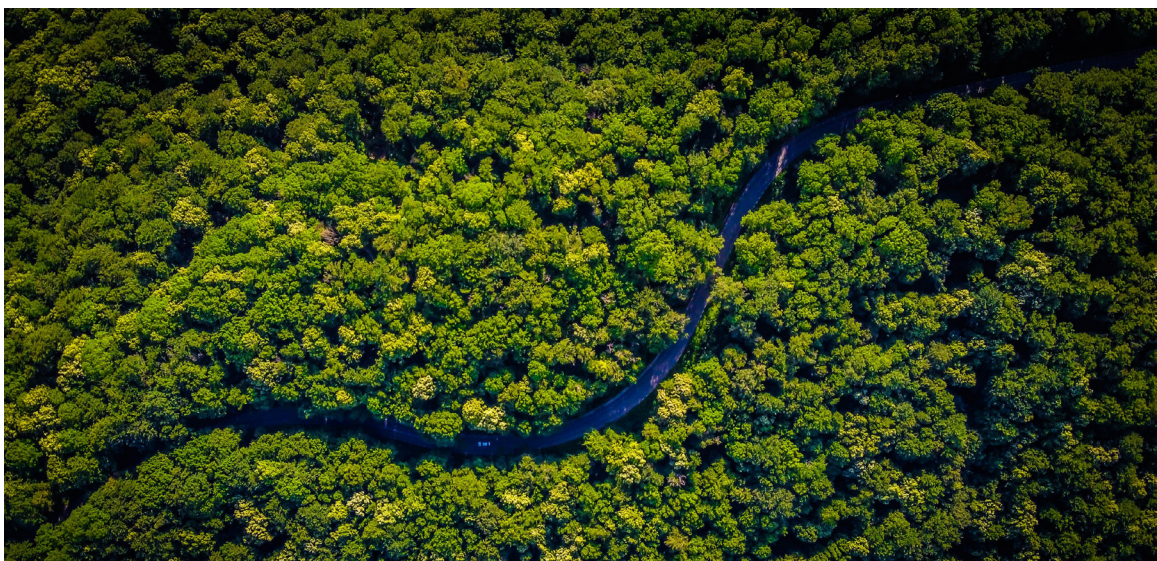
Global Research Networks

Future Earth's Global Research Networks advance cutting-edge Earth systems science, each with a particular sub-focus and building on the power of networks (linking science, policy, business, and civil leaders) to bring about collaborative solutions for complex problems. During the past year, Global Research Networks have re-started in-person steering committee meetings, congresses, and symposiums. The Global Research Networks also engaged in cross-Global Research Network meetings to share knowledge and develop a common language to speed up participation. Below we introduce the networks and highlights of their achievements.

AIMES



Analysis, Integration, and Modeling of the Earth System (AIMES) is an international network of Earth system scientists that bridge across the natural and social sciences to better understand the integrative role of human activity in the Earth System. AIMES runs an International Project Office at NASA GISS and coordinates efforts through working groups and community building workshops, which are guided by an international scientific steering committee (SSC). The key highlight this year was the publication of a review article in *Science* on **forest degradation in the Amazon** led by AIMES SSC members David Lapola and Patricia Pinho as a product of an AIMES workshop held in Manaus, Brazil. An international team of 35 scientists and researchers contributed to the article concluding that human activity has degraded more than one third of the remaining Amazon rainforest through the degradation processes of selective logging, fire, edge effects, and extreme drought. Coverage of this study was featured on the cover of *Science* and in media including The Guardian, BBC News Brasil and CNN. Other highlights include: The Open Modeling Foundation, dedicated to



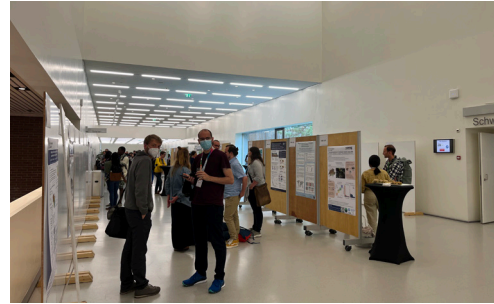
promoting open science and FAIR principles in social and ecological modeling communities, featured their efforts in two papers; the AIMES Working Group on Land Data Assimilation annually convenes over 100 land surface modelers from the Numerical Weather Prediction and Earth System modeling communities to advance DA development and improve the quantification of uncertainty in land surface models, land carbon budget estimates, and therefore future climate projections. The outcomes of these annual workshops were featured in two publications; the AIMES Working Group on Tipping Elements in the Earth System working group, in addition to a convening an online discussions series in collaboration with the Earth Commission and WCRP on tipping points, irreversibility, and abrupt changes in the Earth system, is developing a standardized experimental design to explore committed impacts, reversibility and rate of forcing on tipping points called the Tipping Points Model Intercomparison Project (TIPMIP) led by Ricarda Winkleman and Jonathan Donges at PIK, Germany. To support the data needs for this model intercomparison project, a workshop, “Tipping Points and Understanding EO data needs for TIPMIP,” was held at the ISSI in Bern, Switzerland. The AIMES/GLP working group on Behavioural Models of Land Systems (BeModelS) organized an open online meeting to convene social-ecological land system modelers to refine the aims and objectives of the working group.

bioDISCOVERY



bioDISCOVERY is an international research programme fostering collaborative interdisciplinary activities on biodiversity and ecosystem science. A key highlight this year was our role in helping to organize the World Biodiversity Forum at Davos. Some 700 participants from 60+ countries attended in person or online. Forty-four thematic sessions ranging from evolutionary biology to socio-ecological and socio-economic systems, from freshwater to mountains, and from monitoring to modeling of biodiversity and ecosystems, were complemented by more than 20 workshops and panel discussions. Fourteen plenary presentations examined different facets of the multidimensional linkages and relationships between humans and biodiversity in the Anthropocene. At the end of the conference, participants adopted the 2022 Davos Resolution, developed in collaboration with Swiss think-tank Foraus. In collaboration with GEO BON, bioDISCOVERY organized a series of expert

consultations providing input to the negotiations of the Kunming-Montreal Biodiversity Framework. The science briefs were welcomed by parties, and regularly consulted during the negotiation process. bioDISCOVERY members participated in CBD SBSTTA 24, OWE4 and COP15 as observers, and contributed to the 5th Science-Policy Forum for Biodiversity, in December 2022 in Montreal, Canada.



Earth System Governance



The Earth System Governance Project is a global, interdisciplinary research network advancing knowledge at the interface between global environmental change and governance. The project aims to explore political solutions and novel, more effective governance systems to cope with earth system transformations. The network connects and mobilizes scholars from the social sciences and humanities working from local to global scales. In 2022, the Earth System Governance Project hosted its most significant conference to date in a hybrid format. More than 520 participants presented their research on the conference theme, “Governing accelerated transitions: justice, creativity, and power in a transforming world.” We extend our sincere thanks to the host institutions, the Universities of Toronto and Waterloo, and to the conference co-chairs Sarah Burch, Matthew Hoffman and Steven Bernstein.

The project focused in 2022 on creating relevant research that addresses the pressing and emerging challenges in our field, with a priority on building an even more pluralistic research community. These aims are being pursued by structuring opportunities for inter- and transdisciplinary research throughout the conference and task forces, as well as a newly developed initiative for South-South research exchange. The network’s flagship Earth System Governance Journal received an impact factor and is now listed in Scopus and Web of Science. The project’s Scientific Steering Committee welcomed three new members: Fariborz Zelli, Dhanasree Jayaram, and Kyla Tienhaara.



Emergent Risks and Extreme Events Knowledge-Action Network



Extreme climate and weather events, the associated disasters and systemic risks are becoming increasingly critical in the context of global environmental change. They are a major threat to the achievement of the SDGs and one of the most pressing challenges for future human well-being. The Knowledge Action Network on Emergent Risks and Extreme Events provides an open platform for scientific communities

from multiple disciplines working on extreme events, systemic risks, disaster risk reduction and governance to exchange information, knowledge and data and engage in collaborative research activities. Our Working Groups span a wide range of topics such as Compound Events, Early Warning, Climate Risk Modeling and Management or Metabolic Risks on Islands. In 2022 they organized a series of high-level webinars. The Compound Events WG co-organized the 2nd Como Training School on Compound Events, which provided Early Career researchers with a comprehensive introduction to compound events, to various statistical approaches and frameworks for their assessment. Additionally, a group of members were able to secure funding for the EU Horizon project “The Human-Tech Nexus - Building a Safe Haven to Cope with Climate Extremes.”

EvolvES



EvolvES aims at providing an evolutionary framework for biodiversity science. The Population Genetics group published a novel modeling approach based on analyses of climatic niche suitability and the environmental centrality hypothesis, where fitness is expected to be highest in sites with environments closest to the center of the niche of the species. These results can set the basis for future work – whole genome or gene-targeted sequencing, as well as a

higher number of field-sampled individuals, would allow assessment of hybridization and specific gene introgression (Espindola et al. 2022).

The EvolvES network developed a hybrid session for SRI2022, “How evolutionary biology can contribute to achieving the UN’s goals,” moderated by the South African Science Journalist Sibusiso Biyela. Nine speakers each had six minutes to explain their cases and to open the discussions on how this evolutionary thinking can contribute to achieving the SDGs, in both a global and an African context.

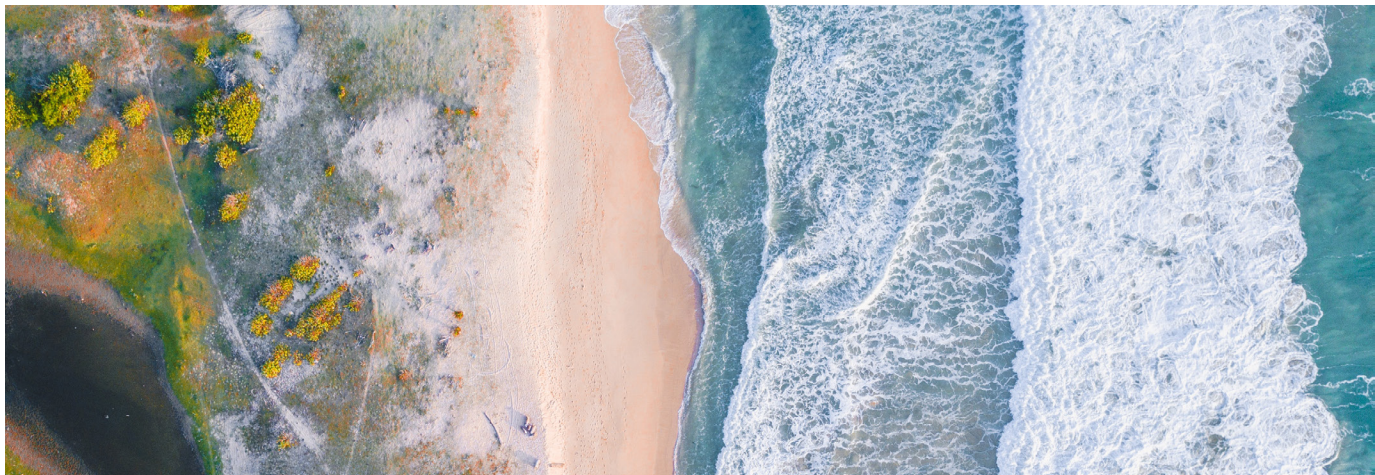
Finance and Economics Knowledge-Action Network

The Finance and Economics Knowledge-Action Network has, in its second year of existence, taken steps to develop a baseline of members who are to explore ways to align global financial and economic systems, business models, consumption, and production patterns towards sustainability both conceptually and in practice. This must be through considering the financial and economic system as part of a larger complex socio-ecological system. A co-chair wrote a contribution for the call for inputs by the Katowice Committee of Experts on the Impacts of the Implementation of Response measures. Our members shared research at SRI2022. We are currently exploring a possibility of working together to publish a book on topics related to sustainable finance and economics.

Future Earth Coasts



Future Earth Coasts (FEC) is a global sustainability, research and innovation network that promotes knowledge sharing and action towards implementing the vision for healthy oceans and coasts for a just and environmentally sustainable future. The Lead IPOs are located in China and Australia with additional hubs in the US, Argentina, and Ghana. From 2022 to 2023, FEC expanded its networks with Academy (41 world-leading scholars from 22 countries), Fellows (26 early and mid-career researchers from 15 countries), and Affiliated Projects (11 major global initiatives). In October 2022, FEC sponsored the Physics of Estuaries and Coastal Seas Conference held in Shanghai, China. Since December 2022, FEC has been organizing a series of capacity-building events, “**FEC Fellows Sessions**,” to gear up Early Career Researchers by providing meaningful networking and professional development opportunities. In February 2023, FEC launched the interview series FEC dialogue with **Female Scientists** and **Academy Members**. In March 2023, FEC launched ‘Tour de Coasts’ initiative to create a comprehensive understanding of coastal sustainability challenges and opportunities from a global perspective



Global Carbon Project



The Global Carbon Project (GCP) is an international research project that aims to develop a complete picture of the global carbon cycle, tracking trends in global carbon emissions and sinks as a key measure of progress towards the goals of the Paris Agreement. In the reporting period, GCP produced its 17th update to its Global Carbon budget, launched at COP27 on 11 November 2022. The 2022 budget report, [Friedlingstein et al, \(2022\)](#), gathered contributions from over 105 researchers from 18 countries. The science team found that global carbon emissions in 2022 remained at record levels – with no sign of the decrease urgently needed to limit warming to 1.5°C. The 2022 press release was translated into 4 languages, and the team engaged in a series of sessions with diverse stakeholders (including an event at the Coalition for Rainforest Nations pavilion, side event on solutions for food and agricultural systems, online webinar on environmental finance, online webinar for the business community via GreenBiz webcasts, announcement session at the World Climate Summit). GCP’s regional carbon cycle assessment and processes study is in its second phase. The RECCAP2 team issued a call for papers for the forthcoming AGU Special Collection, whose insights will contribute to improving the global budget. For example, [Ciais et al. \(2022\)](#) outlines guidelines on how to integrate and reconcile bottom-up and top-down estimates of terrestrial CO₂ fluxes (Ciais et al, 2022). An IPO for the Global Carbon Budget opened in May 2022, hosted by the University of Exeter.

Global Land Programme



The Global Land Programme (GLP) brings together more than 2,300 land scientists to advance studies of rapid changes to Earth’s environment. GLP moved from the University of Bern in Switzerland to its new home at the University of Maryland (UMD) in February 2022, a shift made possible by a [\\$2.3 million National Science Foundation grant](#) awarded to Associate Research Professor and GLP Executive Director Ariane de Bremond as PI (2022-2025). The mission of GLP entails bridging scientific innovation with societal relevance and employs place-based research to feed synthesis-understandings of the patterns and processes of global change and related debates in global policy settings. Within this overall strategic setting, the International Programme Office (IPO) will enable GLP to 1) Set agendas and facilitating synthesis in Land Systems Science (LSS); 2) Produce cutting-edge LSS worldwide; 3) Inform and support science-based policy on land; and 4) Build capacity of the LSS community to deliver inclusive, solutions-oriented science. In May 2022, the Future Earth France Global Hub together with GLP held a workshop on identifying and accounting for telecouplings/cross-scale linkages in navigating pathways towards better outcomes for biodiversity and human well-being, aimed at conceptualizing and addressing the roles of cross-scale and cross-national interactions (telecouplings) in science-based pathways. A postdoctoral research associate based at VU Amsterdam and sponsored by the Wyss Academy for Nature will continue research on this theme in 2023-24 in preparation for a second phase.

Global Mountain Biodiversity Assessment



The Global Mountain Biodiversity Assessment (GMBA) provides a platform for international, trans-, as well as cross-disciplinary collaboration on mountain biodiversity research, assessment, conservation, and sustainable management. GMBA pursues the objectives of: Connecting mountain biodiversity knowledge holders, producers, and users across scales; providing tools and data infrastructures in support of mountain biodiversity science; facilitating

processes of mountain biodiversity knowledge creation; building capacity for sustainable mountain biodiversity conservation and management; and transferring and disseminating mountain biodiversity knowledge. A key highlight is the release in open access of the new GMBA mountain inventory v2.0 with 8,616 named polygons organized in a hierarchical structure. A second highlight is the release of an online resource for exploring SDG 15.4.1 (the percentage coverage by protected areas of important sites for mountain biodiversity) in individual mountain ranges worldwide and downloading one-pagers with data for each of these ranges. Our SDG visualization tools uses the new GMBA inventory to disaggregate SDG 15.4.1 to the level of individual mountain ranges and thereby addresses the shortcoming of reporting on mountain biodiversity conservation at national scale. Our SDG work was featured at the COP15 in Montreal.

Health Knowledge-Action Network

Members of the Health Knowledge-Action Network dedicated their efforts to revisiting collaborative projects, brainstorming strategies to make their academic knowledge accessible to governments and the general public, fundraising, exploring the possibility of an IPO, and welcoming new members to the Steering Committee. Following their governance plan, Health expanded its membership, particularly with Early Career Researchers and played a significant role in shaping research priorities and disseminating information for the Belmont Forum's call on Climate, Environment, and Health II. Members showcased their expertise by presenting at SRI2022 and contributing to the Intergovernmental Panel on Climate Change (IPCC) in various capacities. Their contributions extended to the "10 New Insights in Climate Science" report, where they highlighted the emerging threats posed by climate-health interactions. A previous insight developed by Health received funding to assist governments in implementing mitigation efforts to protect public health. Other noteworthy accomplishments included the publication of "Green and Blue Spaces: Crucial for Healthy, Sustainable Urban Futures" in The Lancet journal, and the completion of a comprehensive review on "Human Health and Climate Change in the Pacific." Dr. Kristine Belesova initiated a project funded by the ESA-Future Earth Joint Program, demonstrating the proactive engagement of Health members in advancing research endeavors. The network actively supported Future Earth on a larger scale, with one of its co-chairs serving as a co-chair for the Future Earth Assembly, fostering collaborations and setting an agenda for the organization. Health KAN is developing new initiatives centered around: 1) Ageing and Sustainable Development, 2) Climate-Smart Healthcare, 3) Governance of Health, and 4) Risk and Health.



The International Global Atmospheric Chemistry (IGAC) Project seeks to advance atmospheric chemistry towards sustainable work. IGAC does this by international networking through regional working groups, science-based activities, conferences, workshops, online communications, and other community-building and knowledge-advancing activities. This year, IGAC hosted its first-ever hybrid meeting and first in-person conference since 2018 in Manchester, UK in September 2022. More than 250 people attended in person and 100+ attended online, with 38 countries and all continents represented. Before the conference, a 40-person early career scientist short course took place with scientists supported by IGAC and EGU. This short course was planned by an international committee of

early career scientists and allowed both learning and community building between the international participants. Opportunities for early career scientists to network with senior scientists were also facilitated during the short course and main conference, as networking was cited as a major need for scientists beginning their careers during COVID. Other highlights of the year included the formation of the first IGAC early career scientific steering committee, the Tropospheric Ozone and Assessment report workshop in Germany, a number of IGAC-sponsored sessions at SRI2022, and other ongoing activities.

IHOPE



Integrated History and Future Of People on Earth (IHOPE) is a global network of researchers and research projects using integrative frameworks to provide long-term, human-scale perspectives combining Earth system science with the social sciences and the humanities. IHOPE's SSC had three meetings during the year – all organized digitally, a practice which we will continue post-pandemic. During the reporting year, IHOPE's SSC published 83 articles and chapters and 19 book chapters/books and two policy papers broadly relevant to Future Earth's scope of interest. IHOPE also participated in a number of workshops/conference sessions. In 2022 we added a new function on our webpage which gathers links to recorded workshops/seminars within the interest sphere of IHOPE. We also organized two dedicated seminar series which are available online. A highlight this year is the open access IHOPE publication of the book [If the Past Teaches, What Does the Future Learn? Ancient Urban Regions and the Durable Future](#). The book [Irrigation in Early States: New Directions](#) featured a number of IHOPE scholars contributing with an outlook to the present and future. Another highlight is the publication of the book [Perspectives on Public Policy in Societal-Environmental Crises: What the Future Needs from History](#). IHOPE now hosts an independent junior scholar magazine called [Between Territory and Earth](#) intended to present a wide array of novel ways to address today's challenges through creative approaches to research and generative discussions. This will be disseminated to the wider IHOPE junior scholar community.

iLEAPS



Integrated Land Ecosystem Atmosphere Processes Study (iLEAPS) coordinates and promotes world-wide scientific research in the field of ecosystem-atmosphere exchanges and their impact on society. The iLEAPS-OzFlux Open Science Conference took place at the Auckland University of Technology, New Zealand 30 January - 4 February 2023, preceded by an in-person iLEAPS SSC meeting. SOLAS, IGAC, AIMES, MRI, Water Future and GEWEX gave presentations on areas of potential research collaboration. Best Oral and Poster presentation awards were given to Early Career Researchers. In January 2022, iLEAPS Asia



launched a Monthly Colloquium. We also organized a Virtual Lite conference in May/June 2022 involving three sessions of experts talks. iLEAPS SSC members published 82 peer-reviewed articles in journals/proceedings, three books, two book chapters and five policy briefings in total. The iLEAPS Early Career Researcher network produced seven podcast series during April 2022-March 2023. iLEAPS also submitted a paper in 2023 to the Future Earth special issue, "Charting the course for the next decade of Sustainability Research and Innovation," in the journal *Global Sustainability*. iLEAPS SSC members convened/co-convened three sessions with IGAC at the SRI2022. iLEAPS also contributed to the Future Earth side event at COP27, "Wildfire increase: a challenge for earth system and society," together with colleagues from SOLAS, AIMES and PAGES. iLEAPS and Future Earth Taipei Hub will also collaborate on quarterly webinars for ECRs.



IMBeR



Integrated Marine Biosphere Research (IMBeR) focuses on ocean sustainability for the benefit of society in the context of global change. In 2022, Ecosystem Studies of Subarctic and Arctic Seas (an IMBeR Regional Programme) held its Annual Science Meeting in Seattle, Washington, titled “Bridging the past and present to manage the future of northern fisheries and ecosystems.” In 2022, IMBeR published a 2-volume special issue ‘IMBeR West Pacific Symposium: Changing West Pacific Ocean: Science and Sustainability’; and in 2023, Integrating Climate and Ecosystem Dynamics in the Southern Ocean (an IMBeR Regional Programme) completed a 23-article special issue, “Marine Ecosystem Assessment for the Southern Ocean: Meeting the Challenge for Conserving Earth Ecosystems in the Long Term.” IMBeR also seeks to develop capacity and promote diversity, equity, and inclusion in ocean sustainability science. Last year, this work included IMBeR’s Human Dimensions Working Group co-convening the 5th Center for Sustainable Development Annual Conference on Sustainable Development titled “Unpacking Sustainability, Resilience, and Equity,” in Bangladesh; and IMBeR’s Interdisciplinary Marine Early Career Network building its membership to over 1100 from 103 countries and delivering an online workshop addressing “Fostering Diversity, Equity and Inclusion in Interdisciplinary Marine Sciences.”

Integrated Risk Governance

As we approach the midpoint of the implementation of the UN Sendai Framework for disaster risk reduction, a Midterm Review of the Implementation of the Sendai Framework 2015-2030 was called by UNDRR. IRG Project had taken the lead to coordinate our community to identify weakness and opportunities in the global efforts of building resilience under the impact of the pandemic. Workshops, conferences and online seminars have been conducted with participants from not only the risk science field but also decision- and policy-making communities. Reports and policy recommendations on the expected outcome to further pursue risk-informed sustainable development were produced and delivered to international and national agencies including those related to sustainable urban development, insurance for development, climate and water. Research to better understand systemic risks in low elevation coastal zones and cities has been organized and conducted by international experts with cross-regional, inter-institutional, and interdisciplinary backgrounds. With the green climate resilient development trends, climate and environmental disclosure (C-ESG) reporting is becoming an essential component of the company reporting requirement. This emerging global trend is now ascending in many developing countries including China as it seeks to green its economy and improve social development. IRG Project coordinated international experts to conduct in-depth research on theories, methods, standards and frameworks of climate and environmental risk disclosure from both domestic and international resources. Several capacity-building training seminars were conducted with the strong support and cooperation of the local government agencies. This research work helps China-listed companies on understanding and better preparing disclosing C-ESG issues. Challenge questions have been clearly identified and addressed to participating corporations, such as excessive focus on ratings without putting efforts on communications and public relations strategy, board and management oversight, and assessment and monitoring. IRG Project will continue to work with business sectors and governance regulators to help achieve business sustainability.

MAIRS



Monsoon Asia Integrated Research for Sustainability (MAIRS) is a regional consortium to promote the integrated study of earth system processes in the Asia Monsoon Region. During the reporting period, MAIRS promoted collaboration among research programs and networks to tackle the increasing health impacts due to air pollution, climate change and extreme weather. MAIRS co-organized the Opening Plenary of Asia Spotlight Event at SRI2022 in June with participation by the Chinese National Committee for Future Earth and WCRP-CORDEX. Participants advocated for the sharing of different types of data to improve modeling and application for policy. MAIRS also co-organized a session on AiR-Climate-Health (ARCH) nexus during SRI2022 with the Global Atmosphere Watch (GAW) Programme of the WMO. Participants exchanged ideas with WHO Collaborating Center on Air Quality and Health and UNEP Global Ambient Air Monitoring Project. The event aimed to promote the joint efforts to enhance pollution control and climate mitigation to protect the public health among global research programs and research institutions.



Ocean Knowledge Action Network



The Ocean Knowledge Action Network brings networks together to share knowledge among those working to co-design ocean science and knowledge for sustainable development. We focus on building trust and relationships between our regional partners, UN Decade of Ocean Science-endorsed programs, international networks, universities, and private sector partners. Highlights for the year include: A special issue in the ICES Journal of Marine Sciences, members proposed a new International Panel on Ocean Sustainability, mentoring and judging of the Ocean Hackathon in Malaysia, a keynote speech at the Ocean Hackathon Grand Finale (France), and the co-creation of a workshop on science storytelling with partners from the Seychelles, and the Western Indian Ocean Early Career Scientists Network. We held our first in-person meeting hosted by Future Earth Taipei's Ocean Working Group, Future Earth Taipei Global Hub, and Academia Sinica where we updated our governance, common purpose, and ways of working. The Ocean Knowledge Action Network created a Values Charter for our community members, welcomed a new partner in Malaysia, and launched monthly community meetings. We hosted webinars on network building and, with the support of SCOR and SOLAS, continue to co-design a networking platform with Acter.global.

oneHEALTH

oneHEALTH explores links between global environmental change and health for the planet and society. This year, we focused attention on scientific priorities and policy options toward upstream prevention of health crises, including pandemics. oneHEALTH contributed to the “10 New Insights in Climate Science” released at COP27, bringing a One Health scope. We are in the process of finalizing a scientific manuscript about the impact of Nature Based Solutions on zoonotic disease transmission risk. We started development of an indicator to be used for ecosystem monitoring and management and in Global assessments such as IPBES in combination with the Red List of Ecosystems to assess the capacity of an ecosystem to provide health related services. oneHEALTH scientists presented on the economics of health-benefiting ecosystem services at Liberia's National Workshop on One Health and Protected Areas and supported the consultation on WHO draft indicators on Biodiversity for Nutrition and Health. oneHEALTH scientists participated in the UN Biodiversity Conference, COP15, in December 2022, presenting at the WHO Workshop on Health, Climate, and Biodiversity and World Biodiversity Summit. Our scientists are serving on expert bodies, including the IPBES Nexus assessment and One Health High-Level Expert Panel advising the FAO, UNEP, WHO and WOA. H.

Past Global Changes



Past Global Changes (PAGES) aims to facilitate international collaboration and interdisciplinary science to provide a better understanding of the Earth's past environment, vital for robust future climate projections. In November 2022, INQUA and PAGES jointly organized a hybrid workshop on Past Socio-Environmental Systems (PASES), prepared and run by early-career researchers (ECRs), to facilitate scientific exchange between ECRs working on climate-environment-cultural change. It highlighted the importance of an interdisciplinary approach to understand socio-environmental systems. The 6th Open Science (OSM) and 4th Young Scientists (YSM) meetings were organized online in May 2022. Sixty selected ECRs attended the YSM, where they discussed the skills scientists need, in addition to being excellent researchers. More than 500 researchers attended the OSM and presented their most up-to-date scientific results. PAGES working groups tackle broad questions that require integration of the wider international science community. Amongst the many results published, worth highlighting is Wilhem et al.'s (2022) work that compiles paleoflood records to test the impact future climatic

trends might have on flood frequency and magnitude in the European Alps. They demonstrate that a warming of 0.5–1.2°C led to a 25–50% decrease in the frequency of large floods, but extreme (>100yr) floods may increase in certain alpine catchments.

PECS



The Programme for Ecosystem Change and Society (PECS) is a network of place-based social-ecological research and practice. Following the adoption of new science themes and a call for working groups in 2021, a major landmark for PECS in 2022 was the launch of 14 working groups that will be working toward understanding the dynamics of the Anthropocene, fostering stewardship in diverse contexts, transformation to sustainable futures, and mainstreaming knowledge co-production. These working groups, along with three regional nodes (in Southern Africa, Latin America, and North America) represent the heart of PECS and we're excited to see cutting-edge work emerging through these networks. Other highlights include: The publication of a special feature in the journal *Ecosystems & People*, celebrating the last ten years of PECS, highlighting the role of our community in deepening, and growing the social-ecological systems field across the world. Additionally, ResNet (North American node) published a special feature in the journal *Facets*; a website on methods for social-ecological researchers; the return of in-person meetings! Several working groups and regional nodes had in-person engagements in 2022; a change of directorship, as Prof. Alta De Vos took over from Dr. Odirilwe Selomane in March 2022.

SOLAS



Surface Ocean-Lower Atmosphere Study (SOLAS is the only international program designated for the coupled ocean-atmosphere system in the context of climatic and environmental changes as it aims to quantitatively understand the key biogeochemical-physical interactions and feedback between the ocean and atmosphere. SOLAS continued to grow strongly in the

past fiscal year and organize highly impactful activities. The newly initiated quarterly SOLAS Seminar Series has attracted nearly 1,000 researchers from over 30 countries. SOLAS organized its 8th Summer School online, which trained 62 students from 24 countries by 29 international and interdisciplinary experts. The 8th SOLAS Open Science Conference in Cape Town, South Africa, welcomed nearly 200 online and on-site participants. SOLAS made breakthroughs in engaging underrepresented regions and launched a Regional Panel in Southeast Asia. SOLAS also established its feature committee, Early Career Scientist Committee, which has already shown significant momentum to further strengthen SOLAS sciences and networks despite being newly formed. The new SOLAS MSc programme on Ocean, Atmosphere, and Climate is up and running at the University of Galway, Ireland. SOLAS launched a wildfires initiative to address the impacts of fire emissions on the ocean and society. A side event at COP27, along with several other events, was organized around this topic.

Systems of Sustainable Consumption and Production

The Systems of Sustainable Consumption and Production (SSCP) Knowledge-Action Network emphasizes the need to address whole provisioning systems, including consumption practices and production conditions, as well as lifecycle impacts and the economic, political, social, and cultural imperatives that impel consumerist lifestyles. A major endeavor this year was organizing an online conference on “Transitioning to Systems of Sustainable Consumption and Production: from Knowledge to Action” from 8-17 November, 2022. The conference attracted more than 200 registered participants, with sessions ranging from diversification of circular economy research, education and communication for SCP, consumerism and systems change, and zero waste transitions. The following Working Groups were particularly active this year on some joint initiatives: Circular Economy WG collaborated on a Professional Development Workshop on Biodiversity and Economy at the Academy of Management in August 2022 and development of a Global Circular Economy Roadmap; Communications WG developed a virtual storytelling and exchange program on sustainable consumption and production for youth groups in Europe as well as workshops on weak and strong sustainability approaches; and Social Change Beyond Consumerism organized a series of lectures around how to imagine and engage in social change, such as “Making sustainable food futures stick for practices, policies and palates” and “Sustainable consumption in a Pandemic: a collection of papers from the Everyday Life in a Pandemic Consortium.”

Urban



The Urban Knowledge-Action Network is a global network of researchers and innovators dedicated to sustainable urban development. Members have contributed to various events and activities promoting research and solutions toward sustainable urban development. Our members contributed to several chapters in the Sixth Assessment Report of the IPCC. The network hosted and delivered urban science talks to accelerate global urban sustainability transformations, such as the SRI2022 Congress and the 2023 International Symposium, “Just Transition” toward De-carbonized Urban Systems together with

Future Earth Taipei. Network members also participated in the Future Earth Assembly and the IIASA-hosted Scenarios Forum. Major outputs include: The WG II report, “Climate Change 2022: Impacts, Adaptation, and Vulnerability,” and the WG III report, “Climate Change 2022: Mitigation of Climate Change,” along with other reports including [scenario forum report](#) and publications [Bai et al., \(2022\)](#); [Kilkis \(2022\)](#), or [Hahn et al., \(2023\)](#). Members contributed to a G20 policy brief, “[Empowering cities in the race to a just net-zero transition,](#)” proposing a dedicated G20 agenda on urban climate governance to support cities in becoming key actors in the race to net-zero. Urban KAN members Dr. Timon McPhearson and colleagues are featured in a three-part documentary series, “[Brink of Disaster,](#)” on Discovery+. Dr. Tischa Muñoz-Erickson was awarded a grant from NOAA’s Climate Adaptation Partnerships program to develop a Caribbean Climate Adaptation Network (CCAN) with other researchers.



The Sustainable Water Future Programme (Water Future) of Future Earth is a global platform facilitating international scientific collaboration to drive solutions to the world's water problems. Consistent with the broad objectives of the Sustainable Development Goal for Water, research conducted through Water Future seeks to ensure a balance between the needs of humankind and nature, and to offer real solutions, underpinned by interdisciplinary science, to deliver a sustainable 'Water World'. Intergovernmental Hydrological Programme (IHP) of UNESCO and Water Future developed a joint action plan, "Science for SDG6: Science to accelerate the implementation of SDG6, focusing on the role that 21st Century Science can play in addressing the gaps in SDG monitoring, assessment, and implementation. As part of the action plan, two high-level task forces were formed with world-renowned scientists, governance, and policy experts. The task forces explored in-depth the scientific models and tools that can support the SDG implementation in monitoring, infrastructure planning, policymaking, and impact evaluation. The task forces also explored the benefits and institutional complexity of applying the scientific tools in SDG implementation for the member countries. It recommended strategies to overcome the challenges so that Science can effectively contribute to SDG 6 Acceleration. As part of the initiative, **Water Future and UNESCO proposed a game-changing idea** of the Intergovernmental Science-Policy Platform for Water Sustainability (ISPWAS) as a solution-oriented scientific assessment. It will be implemented by national entities regularly, with continuous updates developed in close coordination with relevant UN agencies and other intergovernmental mechanisms. The outcome of this initiative contributed to the water science research agenda presented at the UN 2023 Water Conference held in March 2023 in New York.

Water-Food-Energy Nexus

In the framework of Future Earth, Knowledge-Action Networks are networks of people and organizations collaborating to build the knowledge and tools needed to tackle the greatest sustainability challenges of our time. The Water-Food-Energy Nexus Knowledge-Action Network (Nexus) does so in the context of sustainably and equitably delivering water, energy, and food for all. This is achieved through better understanding of the interactions between water, energy, and food systems and managing their trade-offs and synergies. Nexus acts as a liaison between Earth system science, social science, humanities, and society to explore and promote science-based solutions to address pressing water, energy and food system challenges. Nexus facilitates collaboration between existing projects, networks and individuals involved with nexus issues and builds on their knowledge, expertise and experience.

The Future Earth Nexus steering committee was established in 2018 and has eight members chaired by Prof. Jiaguo Qi. The Steering Committee initiates and stimulates activities in the Nexus Knowledge-Action Network. These activities aim to enhance collaboration and interaction among the research and practice communities working on nexus issues, spurring the co-creation of new knowledge and the application of knowledge in practice.

National and Local Committees: Updates from around the Globe

Future Earth Local, National and Regional Structures forge a bridge between local, national and regional sustainability science and research and the global sustainability community, aggregating knowledge and inspiration from the ground to the global and back. Below are examples of this critical work.

Asia

The Future Earth community in Asia is growing and includes several research networks working on various sustainability issues in the region: Health Investigation and Air Sensing for Asian Pollution (HI-ASAP), Sustainability Initiative for the Marginal Seas of East and Southeast Asia (SIMSEA) and National/Local Committees in Australia, China, India, Japan, Korea, Mongolia, Philippines, and Taipei. In 2022, a new National Committee in Thailand was formed and welcomed into the Future Earth Community.

In order to facilitate coordination and facilitation of regional collaboration, an Asia Task Force was set up by Asia-based Global Secretariat Hubs in Japan, Taipei, South Asia, and China. During this period, several meetings with National Committees including regional research networks in the region were held and the idea to set up an Asia Regional Committee was raised which was brought forward as one of the recommendations during the Future Earth General Assembly in Paris in September 2022. The terms of reference are being drafted for circulation.

At the Sustainability Research and Innovation Congress 2022, a virtual Asia Spotlight Event (ASE) was co-hosted by the Asia-based global secretariat hubs that provided a space for the Asian community to reflect on inspiring research and discussions related to the SRI2022 themes with a particular focus on Asia and its connection to the rest of the world. The event covered 15 sessions, three plenaries and two networking sessions that attracted more than 300 participants. With support from early career researcher representatives, a report including the reflections and forward insights from the event is being compiled entitled, “Spotlights on Sustainability + Innovation from Asia.”

- ▶ **The Chinese National Committee for Future Earth (CNC-FE) and Global Secretariat Hub (GSH) China’s** Future Earth Early-Career Researcher Fellowship awarded 14 young scientists to support various sustainability-oriented research. Side events to the 2022 UN Ocean Conference (Ocean Negative Carbon Emission and Sustainable Development) and COP27 (Climate Change and Sustainable Development in the Post-COVID-19 Era), and a series of webinars for young scholars and students entitled, “The Future Earth Virtual Symposium.”

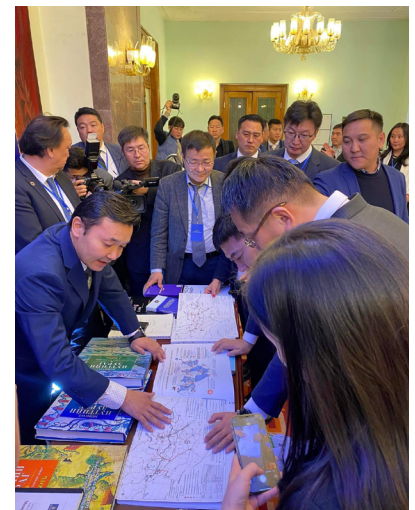
- ▶ **The National Committee in India** organized a webinar on 5 May, 2022 focusing on an Indian Perspective on the Recent IPCC Assessment Reports on Climate Change, attracting 150 participants. Another seminar on the theme “Farming on Warming Planet” was held 13 September, 2022.

- ▶ **The Future Earth Japan National Committee** launched the production of a textbook on Future Earth and an official website in August 2022. The committee also provided support for the Science Council of Japan’s Academic Forum, titled “Transdisciplinary Research Linking Regional Problem Solving to Challenges for Global Environmental Issues,” which aimed to contribute to the promotion of transdisciplinary research in Japan.

- ▶ **The Korean National Committee** is overseeing research on climate change impacts on society and ecology in East Asia as part of the A3 Foresight Program supported by the National Research Foundations of China, Japan and Korea. At SRI2022, two online and one hybrid sessions were organized on COVID-19, Governance and migrant workers, open thermodynamics systems framework for harnessing transdisciplinarity in sustainability research and education and lessons from South Korea for a just and sustainable development in Africa. The committee also launched a monthly brown bag seminar, “Mix and Mingle for Future Earth: Communicate easily on traditional knowledge and complex systems thinking.”

- ▶ **The National Committee for Future Earth Mongolia’s** Science-policy Pathways Program geared towards science promotion and its application into local policy formulation, design and implementation, reached 1200+ people from six provinces and introduced over 300 innovative products from scientific organizations. A MOU signed between local government offices and scientific organizations in 5 provinces in Mongolia has been in effect since January 2022. The committee has been very active in: Organizing various events such as science-policy conferences; training workshops (Vision 2050 long term policy); engaging in processes pertaining to National Adaptation Plan and Voluntary National Review Report 2023 and implementing collaborative research projects.

- ▶ **Future Earth Philippines** launched “The Filipino SDG Action Hour” on 21 August 2022 as a weekly venue for online conversations on knowledge-to-action projects. The three pilot members of the Universities SDG Action Network established by Future Earth Philippines in 2021 continue their path to aligning university functions to the SDGs. The committee organized a session, “When Super Storms Devastate Coastal Areas,” at the SRI2022 Asia Spotlight Event. Opportunities for advocating for sustainability included the NAST PHL ScienTeach symposia for high school students and invitations from universities and the Chemistry Association of the Philippines.

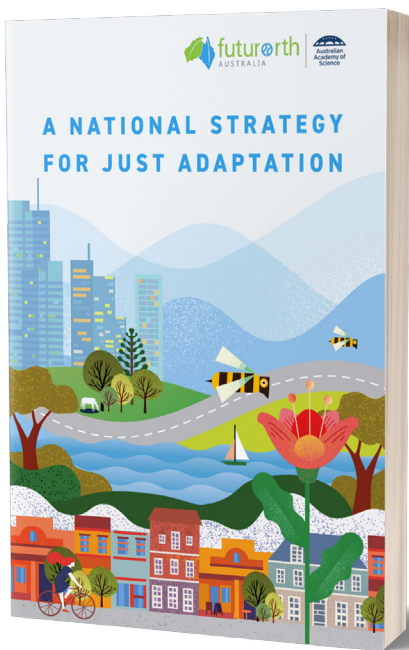


- ▶ **Future Earth Taipei** supported the International Year of Basic Sciences for Sustainable Development and hosted co-branded events with Knowledge-Action Networks: “Just Transition” toward De-carbonized Urban Systems with Urban Knowledge-Action Network in February, and the 2023 Ocean Action Symposium with Ocean Knowledge Action Network in March. Future Earth Taipei helped organize not only eight sessions at SRI2022, but also international workshops on air quality and health. Domestically, Future Earth Taipei organized an Annual Symposium, 24 cross-disciplinary networking, and seven discussion meetings among 11 working groups. Regular online talks, international collaboration and 5 training courses have been conducted for early career researchers.



- ▶ **The Thailand National Committee** was officially ratified by the Future Earth Assembly last September 2022 and has since taken off with plans for future research focused on various topics including flood and drought, land and forest degradation, disease emerging, air pollution, blue carbon, climate impacts, ocean debris and acidity, and disaster management. The steering committee had agreed on proposal development for research funding from the Thai Ministry of Higher Education, Science, Research and Innovation. A seminar on the Earth Space System was organized in September 2022 in Bangkok.





- ▶ In Oceania and the Pacific, **Future Earth Australia** brought together leading voices on sustainability and decarbonization, welcoming 229 delegates at the SRI Oceania Satellite held at the Queensland University of Technology, Brisbane and also helped coordinate the Queensland Decarbonization Forum which featured a series of discussions on Queensland’s ambitions to decarbonize its economy. Future Earth Australia published a ‘must-read’ **National Strategy for Just Adaptation** based on 2 years of research putting indigenous knowledge and justice at the heart of climate adaptation debates. The committee also launched a monthly brown bag seminar, “Mix and Mingle for Future Earth: Communicate easily on traditional knowledge and complex systems thinking.”

Europe

In Europe, there has been an effort for stronger collaboration and coordination among the different European National Committees, which has been supported by both the France and the Sweden Hubs. To that end, an in person-meeting was hosted by the German National Committee in September 2022 in Hamburg to discuss possibilities for collaboration. As a follow up, some of the national committees got involved in the organization of a European **Autumn School on Sustainability Science** and in the **Horizon Scanning in Biodiversity and Climate Science**.

- ▶ Some other highlights from the European National Committees include the **German Committee Future Earth’s (DKN’s)** call for working groups which resulted in six new groups. The former working groups continue their work on a self-sustained basis, with their respective scope and style of working. Building on its position paper, “Research Priorities for Sustainability Science,” published in February 2022, the DKN also hosted a panel discussion on current challenges and important future research fields at SRI2022.
- ▶ The **Swiss National Committee** held a series of dialogue and networking events to strengthen research on the priority areas suggested by the Swiss Academies. The five “Sustainability Science Dialogue” events held at Swiss universities connected experts and practitioners working on alternative economic systems, net zero societies or other of the identified key challenges.



- ▶ The **French National Committee** was involved in the organization of three major events in 2022-23: The Sustainability Science Days Marseille 2022: What are the challenges? What are the opportunities? examined the concept of sustainability science and its implications on research practices and science-society interactions. The Future Earth Day Paris: “International Cooperation for Research on Global Sustainability”, kicking off the 2022 Future Earth Assembly held in Paris in September, was a half day conference on 21 September for the French scientific community working in sustainability science. Finally, the Autumn School on Sustainability Science Île d’Oléron, “What kind of science do we need to move towards sustainability?” gathered around 50 researchers active in France.
- ▶ The **Slovak National Committee** brings together researchers from different scientific organizations (Institute of Landscape Ecology, Slovak Academy of Sciences; Institute of Forest Ecology SAS, p.r.i.; Slovak Ecological Society SEKOS, Global Water Partnership) and universities (UKF Nitra, TUZVO), with which it collaborates closely. The Slovak NC participated in the organization of a seminar about water management, and the organization of a seminar for students as part of a Summer school of young scientists. In May, the 19th International Landscape Ecological Symposium was held in Trenčianske Teplice spa town, Slovakia. Members of Slovak NC actively participated in the preparation of this event.





South Asia

The Future Earth Community in South Asia comprises a **South Asia Regional Office** hosted by Divecha Centre for Climate Change, Indian Institute of Science and engages with a **South Asia Thematic Working Group** composed of members from SAARC, Myanmar and Indian Ocean Island Countries. The Regional Programme focuses on Food Security and Malnutrition (Fo), Health Sensitization (H), Coastal Risk and Resilience (Co) and Sustainable Communities (S) known as FoHCoS. The programme is aimed at developing new sustainable practices and tools in sustainability science and Informing decision-making through Knowledge and Policy Briefs.



Southern Africa

The National Research Foundation's bid to host the Future Earth Global Secretariat Hub began in November 2021 and was approved at the end of March 2022. A two-year phased implementation process is being followed to establish the Africa Hub as a truly global initiative with a strong African presence and voice, integrating Africa's thriving and expanding sustainability science, policy, and funding communities into the global sustainability science arena. The approach taken articulates a clear framework for Future Earth Africa Hub, which includes the 'Africa Hub Leadership Centre' hosted by Rhodes University and the University of Pretoria (financially supported by the NRF) supported by four 'Africa Hub Nodes' strategically located throughout the continent (to be supported by other partner academic institutions and/or funders). By 1 April 2024, the Africa Hub will have a fully functional governance structure. The newly-established **South African National Committee**, South African Global Change Science Committee, strategically provides input into the Future Earth Southern Africa initiative and associated programmes and initiatives within South Africa.

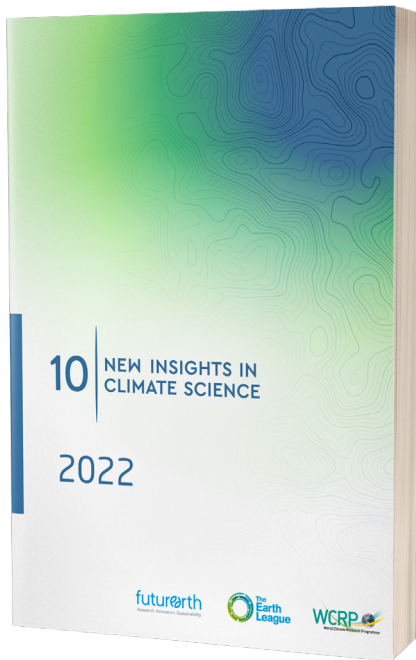
All National Committees and Regional entities also engage collaboratively and with the Future Earth Secretariat to connect local, national and regional work globally.



Future Earth **Programs and Initiatives**

The Future Earth secretariat develops and runs several cross-cutting initiatives that support specific objectives of the Future Earth mission and vision. They engage experts from across the network and focus on synthesis, science-policy, communications, funding, and early career development.

10 New Insights in Climate Science



The **10 New Insights in Climate Science** series highlights essential advances in climate change research, from natural and social sciences, with high policy relevance. An international team of more than 60 researchers collaborate to produce an academic manuscript submitted to peer-review. In 2022, as in the two years before that, the academic manuscript was accepted for publication in the journal *Global Sustainability*.

The **academic paper** provides the foundation for a **policy report**, which this year was launched at COP27 in Sharm el-Sheikh, Egypt, in a press conference with Simon Stiell, Executive Director of the UNFCCC. At the event, Mr. Stiell thanked Prof. Johan Rockström, oversight committee member of the ‘10 New Insights’, and he praised the report:



We have received these Insights at several COPs now, and I know that all delegates eagerly anticipate the findings. (...) You have the UNFCCC’s full support for this report and I will personally share these Insights with parties and non-party groups here at this COP. It provides crucial support for their work, our work, together, here at COP27 and beyond. I thank you.”



The 10 New insights in Climate Science is a collaboration between Future Earth, the Earth League and the World Climate Research Program. It is partially funded by a communication grant from Formas – a Swedish Research Council for Sustainable Development.

Aeon Environmental Foundation Future Earth Dialogue Project

Future Earth Japan Hub together with the AEON Environmental Foundation and National Institute for Environmental Studies organized a dialogue project for setting Japan's national SDGs Targets through dialogue processes.

The team selected Goal 12 “Responsible Consumption and Production” as a theme and an emphasis was put on the dialogue with young generations among others. Five meetings were held, and a questionnaire for AEON Mall visitors was conducted. A dialogue process was proposed to follow 3 steps; visioning the future, identifying present problems, and proposing Targets to fill the gap. This dialogue process and the proposed Goal 12 Target were incorporated in the recommendations by the Japanese SDGs Promotion Roundtable, for the revision of the Japanese SDGS implementation guiding principles, and were submitted to the SDG Promotion Headquarters headed by the Prime Minister in March, 2023.

Anthropocene Magazine

Anthropocene is a cornerstone of Future Earth's efforts to shape the global narrative around sustainability science and innovation. Its articles cut across all Future Earth research pillars—from biodiversity conservation to energy innovation to green chemistry, urban design, and food security.



What distinguishes Anthropocene is its editorial niche. Our goal is not to make people feel better; nor is it to scare them into paralysis. Rather we are forging a sophisticated middle ground: evidence-based journalism that puts the best science and innovations into the hands of those who can do the most with them.

Since Anthropocene launched in 2017, its global audience has grown dramatically. It is now available in university libraries around the world; it reaches over 120,000 unique web visitors every month; and it has more than 45,000 subscribers to its two newsletters:

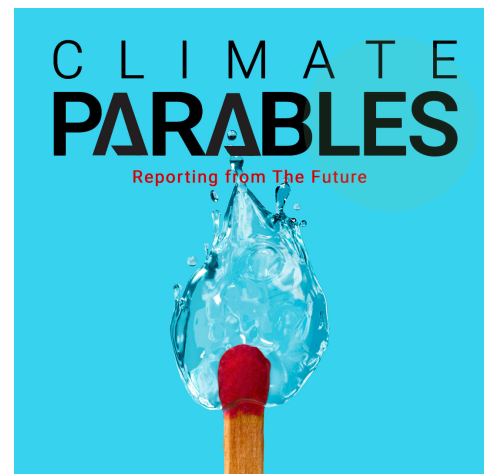
- ▶ “The Weekly Science Dispatch” provides short, sharp summaries of the most compelling climate and sustainability science research from around the world—a compendium found nowhere else. We publish new stories Tues through Friday every week. We now have an archive of over 1,800 stories.

▶ **Fixing Carbon**
Dispatches from an emerging future

“Fixing Carbon: Dispatches from An Emerging Future” is designed as a conversation starter. Each issue zeros in on a provocative and often difficult

climate question to which there is no clear “right” answer. For example: Are climate deadlines dangerous? Can an economy grow its way out of the carbon crisis? Or does a 4-Day work week reduce your carbon footprint? We then explore the question from different angles, in a point-counterpoint format, with links to Anthropocene’s own articles as well as great writing from other outlets. We’ve produced 36 installments to date.

Anthropocene’s newest initiative, “The Climate Parables,” is an innovative fiction series. We are working with top science fiction writers to produce stories from the not-too-distant future that imagine viable technologies and plausible cultural adaptations that empower humanity to persevere—even thrive—in a world under chronic environmental stress. Funding for Climate Parables is provided by the V. Kann Rasmussen Foundation as part of a larger diversified funding portfolio for the entire Anthropocene initiative. Climate Parables stories will be compiled into an anthology and performed live on stage starting in 2023.



Over the next several years, our growth strategy includes:

1

Expanding our reach and growing our readership beyond **50,000**;

2

Rolling out new streams of content—such as The Climate Parables Live on stage—with the help of foundations and sponsorships;

3

Continuing to develop a self-sustaining revenue stream through a robust membership/donation program.

Belmont Forum Collaboration



Future Earth continues to advance transdisciplinary research through its joint work and participation in Belmont Forum Collaborative Research Actions (CRAs). In addition to proposing new themes for transdisciplinary, transnational

research, such as the Environmental Peacebuilding theme that was accepted at the 2022 Plenary Meeting, Future Earth also helped to coordinate the Food-Water-Energy Nexus awardee cohort together with JPI-Urban Europe and the Sustainable Urbanisation Global Initiative. During this 2022-2023 reporting period, this coordination produced synthesis documents for the European Commission and Belmont Forum as well as lessons learned and recommendations for future calls addressing the urban nexus that were later developed into a set of successive funding calls towards Developing Urban Transitions. Future Earth also collaborated on an Expert Committee on Innovation and Impact Delivery to measure nexus progress towards impact indicators. The findings of that committee and guidance on future efforts to monitor and increase impact of transdisciplinary projects were published in 2022.

Future Earth also plays an important role in scoping and administering Belmont Forum Collaborative Research Actions. The scoping workshops, which help shape the breadth and design of funding calls, are reaching an increasingly broader and diverse audience. Through its various engagement platforms – including the SRI Congress, Future Earth is able to mobilize global participation and funding for Low Middle Income Country (LMIC) experts and stakeholders interested in applying to the Forum. In 2022, Future Earth supported the development of an Africa Regional Call, partnered in the Migration and Mobility and Climate-Environment-Health II CRAs to support LMIC applicants, and contributed to the scoping of calls on Climate Change and Cultural Heritage and Amazon and Tropical Forests. Lessons learned from working in these flexible funding partnerships have led to the publication of two book chapters on transformation finance models in transdisciplinary volumes.



Early Career Researchers (ECRs)

Future Earth seeks to engage diverse early career researchers from all regions in order to strengthen global environmental change and sustainability science. Future Earth is supporting and encouraging innovative and influential ECRs to undertake inter- and transdisciplinary research addressing the physical, biogeochemical and human dimensions of global environmental change. The growing Future Earth ECR Network entails numerous benefits, such as funding opportunities and relevant vacancies, call for papers, dissemination of events, capacity building events, conferences and workshops. The continuous support of Future Earth to the ECR community is pivotal for the long term advancement of the organization's goal and mission.

Several capacity building programs and events are being organized for early career researchers supported by Future Earth Global Hubs.

The Transdisciplinarity for Early career Researchers in Asia or TERRA School is in its fourth year and had another run in October 2022 bringing together 13 participants from eight Asian countries and regions. Co-hosted by Research Institute for Humanity and Nature (RIHN) and Future Earth Japan Global Hub, the course featured lectures, workshops and interactive sessions on transdisciplinary research theories and practice, with structured learning on tools and methodologies and case studies from research implemented by RIHN in Japan and abroad. This year the course provided space for ideation and generation of seeds for project development.

A new Early-Career Fellowship (ECF) program launched in collaboration with the Southern Marine Science and Engineering Guangdong Laboratory and Key Laboratory of Tropical Atmosphere-Ocean System provides a forum in which early-career researchers from various disciplines can share their interdisciplinary research and pursue unique collaborations. With the financial support from Secretariat of the China Association for Science and Technology Working Group for UN Environment Consultation Secretariat, and with the colleagues from Future Earth Hubs in China, France, Japan, and the United States help reviewing the applications, 14 early career researchers from 6 countries were selected as the 2022 **ECF awardees**. The ECF selection is based on applicants' merit, research background, and innovative nature of the proposed research topic in relevance to the Sustainable Development Goals.

The "ECRs in Sustainability Science" talk series, organized by the Future Earth Taipei Hub, continued with 20 sessions and included hub to hub collaboration. The virtual events set a platform for ECRs to get to know each other and to share research activities/outcomes. It not only facilitates mutual learning and provides opportunities to find potential collaborators for transdisciplinary research, but also draws attention from international audiences and makes connections between domestic and overseas researchers.

As part of the SRI2022 Asia Spotlight Event, nine Early Career Researcher Representatives from within the region were selected to capture the rich conversations that took place during the sessions. Four of these ECRs delivered flash summaries of the conversations covering the four themes during the Closing Plenary. They are working to compile a written report on the event.

Earth Commission



EARTH COMMISSION
GLOBAL COMMONS ALLIANCE

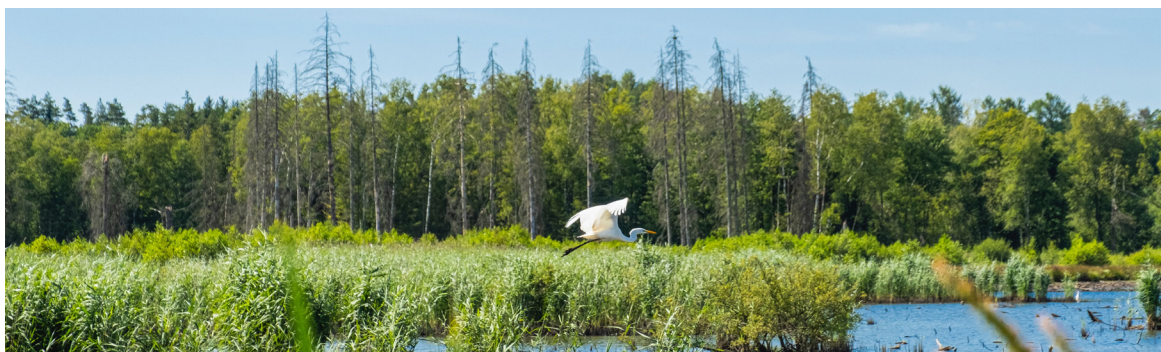
Established in 2019, **Earth Commission** is an international team of leading natural and social scientists hosted by Future Earth, working collaboratively to provide an independent assessment to quantify Earth

system boundaries for essential planetary systems, and synthesize knowledge on translation and transformations needed for the world to live within these boundaries.

The Earth Commission forms the scientific foundation of the Global Commons Alliance (GCA), a unique coalition of actors working together to empower citizens, cities, companies and countries to become effective stewards of the global commons. The GCA will promote the implementation of the Commission's findings through its network of organizations, including the Science Based Targets Network (SBTN), incentivizing actions that move towards staying within safe and just biosphere limits. SBTN and the Earth Commission are collaborating closely to inform how the new Earth System Boundary science can be translated for companies and cities into actionable target-setting methodologies in subsequent releases.

Five working groups (WGs) with experts from the broader Future Earth network, have undertaken specific analyses contributing to the Commission's assessment: WG1 takes a modeling approach with focus on avoiding tipping points to set boundaries for climate as well as air pollution. WG2 sets boundaries to protect the biosphere, with a focus on functional integrity and Nature's Contributions to People, as well as areas of natural ecosystems. WG3 develops boundaries for freshwater, nitrogen and phosphorus. WG4 has developed a framework for integrating justice in the Commission's work, whilst also investigating levers and barriers for the needed transformations. WG5 synthesizes the science on cross-scale translation of the boundaries to scales at which key actors, such as cities and companies, operate.

The main results of the Earth Commission's first assessment are being published and launched during 2023. From April 2022 to March 2023, the Commission submitted two flagship synthesis papers to high impact journals for peer review. A number of working group led papers were published (and several more are under review):



- ▶ *Exceeding 1.5°C global warming could trigger multiple climate tipping points* (McKay et al. 2022) was published in **Science** in September 2022. According to the Carbon Brief, it was the second most mentioned climate and energy-related study in the media in 2022.
- ▶ The Commentary *How to stop cities and companies causing planetary harm* (Bai et al. 2022) was published in **Nature** in September 2022.
- ▶ The study *Impacts of meeting minimum access on critical Earth systems amidst the Great Inequality* (Rammelt et al. 2023) was published in **Nature Sustainability**.
- ▶ In conjunction with the CBD COP15 the paper *Achieving a nature- and people positive future* (Obura et al.) was published in **One Earth**.
- ▶ The Commission's justice framework *Earth system Justice needed to identify and live within Earth system boundaries* was published in **Nature Sustainability** in February (Gupta et al., 2023).

A preview presentation of the Earth Commission's main results was given by the co-chairs Prof. Johan Rockström and Prof. Joyeeta Gupta to a high-level business audience from the plenary stage at **World Economic Forum in Davos in January 2023**.

A successful **discussion series on tipping elements** was launched in 2021 in collaboration with AIMES and WCRP. Until March 2023, 15 webinars featuring leading scientists were held, attracting an audience of up to several hundred participants per event. A global modeling intercomparison project on Tipping Points was also initiated.



Courtesy: World Economic Forum/Sikarin Fon Thanachaiary

The Earth Commission will start its second assessment during 2023. A call for nominations for new Commissioners with complementary expertise was shared with the wider Future Earth Community in March 2023 and the appointment process is ongoing.

The Global Commons Alliance is a sponsored project of Rockefeller Philanthropy Advisors, through which the Earth Commission receives support from Oak Foundation, MAVA, Porticus, Gordon and Betty Moore Foundation, Tiina and Antti Herlin Foundation, William and Flora Hewlett Foundation, and the Global Environment Facility. The Earth Commission is also supported by the Global Challenges Foundation, the Frontiers Research Foundation, Generation Foundation and Formas.



Earth Leadership Program



The **Earth Leadership Program** focuses on training mid-career academic researchers based in Canada, Mexico, and the US in building the skills, concepts, and tools to successfully lead transdisciplinary research projects for sustainability. The 2022-2023 cohort of 22 fellows was selected in 2020, but the training was postponed to June 2022 due to COVID-19. The 6-day core training program was held from June 12-18, 2022 at the

Wingspread Conference Center in Racine, Wisconsin, USA and was funded by the Packard and Moore foundations as well as contributions from fellows' universities. The training was facilitated by staff from Inclusive Innovation and included experiential learning exercises that focused on co-design and the creative problem solving process, creative collaboration, collective leadership, visioning, reflective listening, visioning, network mapping, and reciprocity.

In June 2023, the fellows were set to return to Wingspread to focus on the leadership dimensions of engagement. During the intervening year between the two trainings, each fellow implemented a "learning journey", focusing on making connections with key societal actors related to the visioning and network mapping they had done during the initial training. The program was set to have a final reunion in August 2023 to celebrate the impact and success of its 25 year history of training mid-career researchers. The 2022 Fellows were the last cohort of the program.



European Space Agency Partnership Program



Future Earth partners with the European Space Agency (ESA) to facilitate links between Future Earth's projects and ESA programs, helping to guide ESA's strategic direction and support the networks. There is a **seed fund** to foster

innovative use of Earth observation in the research activities of the Global Research Networks, which supports collaboration.

In 2022 the partnership program funded three research activities of the GRNs on the use of Earth Observations to investigate links between climate, land use change and child health in sub-Saharan Africa (Health KAN), to identify sources of high-latitude dust (SOLAS), and to support BioDISCOVERY in 2 agenda-setting workshops: the first was held at the World Biodiversity Forum in June 2022 to define a Global Biodiversity Monitoring System, a 2nd workshop will be held at GEOBON in Autumn 2023.

The partnership program co-organised a 4-day workshop in October 2022 on remote sensing for climate tipping points with ESA, AIMES, WCRP, experts from Future Earth's Earth Commission, and hosted by the International Space Science Institute in Bern, Switzerland. The meeting brought together the satellite observations community together with the tipping points modeling community, including those leading the Earth Commission's Tipping Points Intercomparison work, to address how Earth Observations together with modeling can support monitoring and process understanding of climate tipping points and their interactions. A series of ten papers are in preparation to be published as a Springer Special Issue.

Future of Washing Initiative

The Future of Washing Initiative was launched in December 2018 together with Future Earth, Kao Corporation, and The University of Tokyo Integrated Research System for Sustainability Science (now renamed as the Institute for Future Initiatives). The Initiative aims to create a discussion platform where various stakeholders from the private, academic and public sectors collaboratively explore innovative and sustainable ways of washing. Since its launch, the Initiative has organized six events and workshops in person and online to foster discussions on the impacts of washing on the environment, and to facilitate a mind shift and a behavioral transformation in society towards sustainable washing.

During the reporting period, the Initiative moved forward with organizing its 7th seminar focusing on “Household Wastewater” and relevant various issues and initiatives across the world including both high- and low- and middle-income countries. The Initiative has also been disseminating blog posts regarding the environmental impacts of washing. Since 2021, the blog series has started to introduce the Japanese translation of the Daily Science articles from the Anthropocene Magazine, and in 2022, it has disseminated more than 20 articles in total addressing various topics, including cutting-edge technologies related to renewable energy such as biomass fuel, the environmental impacts of plastic waste and its reuse, and the role of biodiversity in carbon removal and forest restoration. The Initiative also plans to broaden the scope of discussion, and to explore how cultural and religious diversity can impact washing methods based upon habits and local knowledge.

Grants for Collaborative Sustainability Research Projects

The Program for Early-stage Grants Advancing Sustainability Science (PEGASuS) was renewed in 2022 by the Gordon and Betty Moore Foundation to elevate participation of underrepresented voices in emerging transdisciplinary research. The focal area for PEGASuS V targeted coastal resilience efforts in Latin America and the Caribbean. An award was made to the University of the West Indies for Engineering the Design of Nature-Based Solutions for Sustainable Development in early 2023. One of the team’s efforts includes establishing a network with other coastal resilience experts across the Caribbean at a workshop to be held at the 2023 SRI Congress in Panama.

PEGASuS VI is currently in development, connecting with other programs advancing studies of Risk, Response and Responsibility in Latin America and the Caribbean, including the US Global Climate Research Program’s Latin America and Caribbean Initiative and the World Climate Research Program’s My Climate Risk Lighthouse Activity. Future Earth will work together with interested programs to launch a call that leverages existing collaboration and coordination to support new approaches in this theme. The current timeline would launch the call in Q3 of 2023 with awards by the end of the year. A third program, which will launch in 2024, will align with the Belmont Forum’s Future Leaders effort that is in scoping.

The Pathways Initiative

The Future Earth Pathways Initiative is designed to strengthen and support the capacities of the sustainability science research community to better embrace, engage in, and advance transformative research (t-research).

Through its activities the Pathways Initiative contributes to three main objectives:



advancing concepts and methods in t-research,



fostering a growing community of practitioners engaged in t-research for purpose



collaborate with and support institutional actors in creating a t-research-friendly context

Pathways Forum:

A webinar series designed to provide a space for researchers to share experience and insights on t-research and inter/transdisciplinary approaches, and collectively reflect on the underpinning concepts and practical implications of transformative sustainability science. Through this webinar series, the Pathways Initiative not only aims to federate a community of researchers engaging t-research, but also to develop and support agenda-setting, and capacity building on t-research..



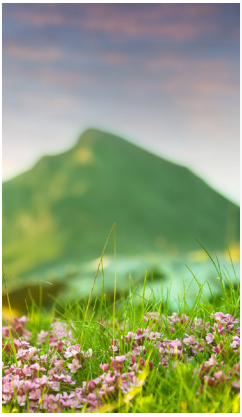


which opened in November 2022, is an ongoing call that seeks to promote wider uptake and understanding of pathways for sustainability within non-expert audiences through the dissemination of inter- and/or transdisciplinary research findings via innovative formats and practices. One third of the funding prioritizes projects led by researchers from and working in low and middle income countries, while another third prioritizes projects led by early career researchers. The first round closed on 31 January, 2022, with a total of 31 submissions from across the globe on a wide range of sustainability topics (e.g. biodiversity, food systems, land, climate change, fisheries, etc.) proposing a variety of communication products (e.g. films, animated videos, podcasts, etc.). Three projects were selected for funding in round one: **“Pescando Transformaciones”**, **10 Facts on Land Systems for Sustainability**, and **Fair Food Futures**. A similar number of proposals were received for round 2, and three projects were awarded: **Bioleft**, **Inspire and Embark!**, and **“Transformation of coffee landscapes: co-production of pathways for sustainability through participatory serious board games”**. The deadline for the third round of funding is 15 June 2023.

The Pathways Postdoctoral Grants Program

was launched in June 2022 with the objective of encouraging international and inter- and/or transdisciplinary collaboration within and beyond the Future Earth community, furthering international engagement in pathways research on the ground, and synthesizing existing knowledge on approaches for developing pathways for sustainability. The grants are designed to support three postdoctoral researchers up to a maximum of 60,000 euros each year over a 24-month period. The postdoctoral researchers will work as part of an interdisciplinary working group, which will include two project co-leads, also acting as supervisors. One of the co-leads must be from a Future Earth Global Research Network (GRN) and working groups must include at least three different entities, including GRNs and Belmont Forum CRAs (Pathways and Transformations 2 Sustainability). The call for expressions of interest closed on 11 September and six projects were invited to develop a full proposal for 18 December. The three awarded projects will begin in the summer/fall of 2023.





Pathways White Paper:

The Pathways Steering Group has produced a white paper, outlining the importance of t-research in sustainability science, the challenges and barriers currently faced by t-researchers and the ways the Pathways Initiative can contribute to addressing some of these challenges and legitimize transdisciplinary and transformative research modes. The Pathways white paper will be submitted to Global Sustainability as part of a special issue entitled [Charting the Course for the Next Decade of Sustainability Research and Innovation](#).

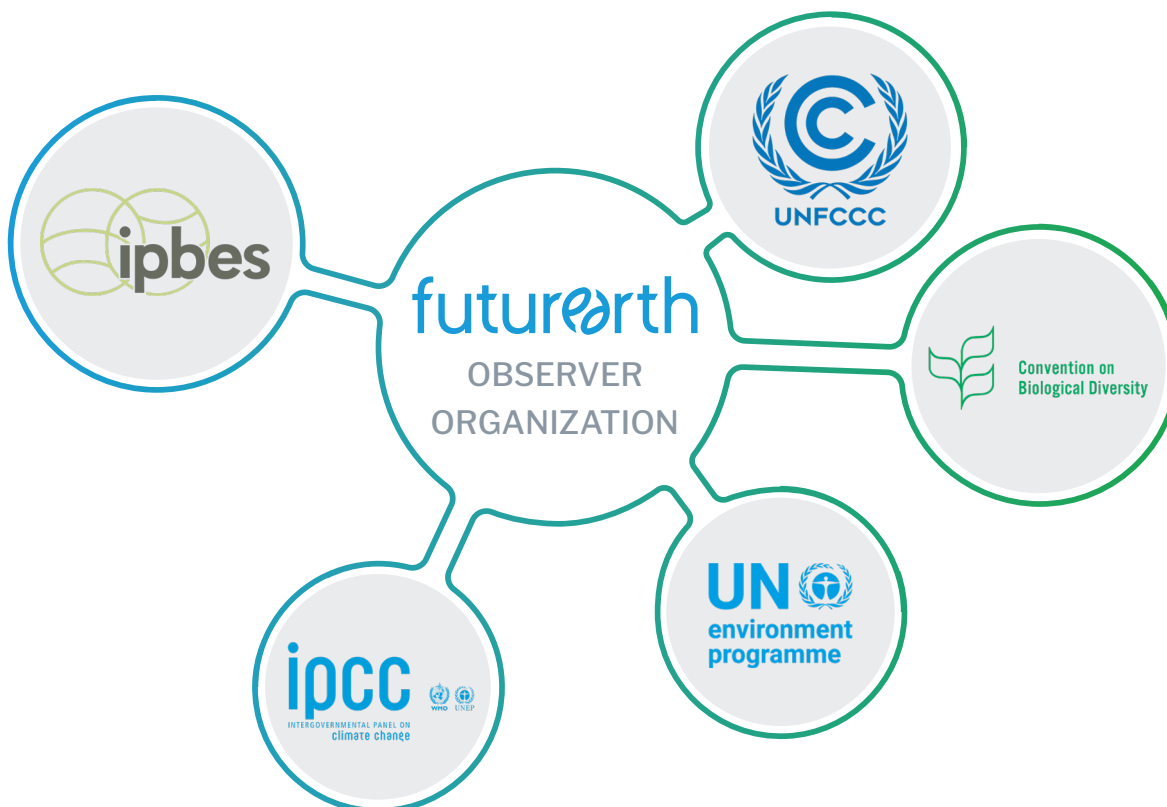
In addition to the Pathways website, communication channels that include a [Pathways Newsletter](#) and a [Pathways twitter account](#) serve to increase the visibility of the initiative and create easier points of engagement for interested researchers. In 2023, a [Mastodon account](#) was created with the aim of phasing out Twitter.

Collaborations with GRNs and institutional actors in the organization of webinars, workshops and conference sessions:

- ▶ **GMBA** (Global Mountain Biodiversity Assessment) & **MRI** (Mountain Research Initiative): Session on pathways research organized at the International Mountain Conference in September 2022.
- ▶ **GLP** (Global Land Programme): In-person workshop organized in France in May 2022, convening pathways and telecoupling experts to reflect on and discuss the implications of cross-scale and telecoupled dynamics on the design and implementation of localized pathways to sustainability.
- ▶ **UNESCO BRIDGES Coalition**: A Pathways Forum webinar organized in February 2023 on the role and importance of the humanities in sustainability science.
- ▶ In partnership with BRIDGES and in collaboration with the Earth Politics Centre, Université Paris Cité, and CERDI (Clermont Auvergne University – CNRS) / European Centre of Excellence on Sustainability, we also organized an online session at the [Learning Planet Festival](#) on “[The learning and knowledge needed, seen from the Future](#)”. We invited the participants to imagine living in a desirable future in the year 2050. Looking back at the year 2023, we asked what additional knowledge and learning processes have made these transitions possible.
- ▶ Belmont Forum: as a result of the collaboration between Future Earth and the Belmont Forum on the joint [CRA Pathways2020](#), the Pathways Initiative provides coordination support for collective activities involving the 13 funded projects, as well as opportunities for sharing project updates via the Pathways communication channels.

Science-Policy

Future Earth is an accredited observer organization in various international science policy interface processes.



Through its extensive scientific community, Future Earth participates in framing sustainability research, research agendas, advising decision makers and more. By engaging its community into opportunities from international processes, Future Earth participated in the following events/reports from April 2022 to March 2023:

► Future Earth at Stockholm+50:

Supported the process of gathering an expert group and coordinated the writing of a **letter** echoing the Menton statement issued 50 years ago in the scope of the Stockholm+50 conference hosted by Kenya and Sweden in collaboration with UNEP.



- ▶ **Side event at the UN Ocean Conference** in Lisbon, Portugal in June 2022: The event aimed at presenting the Future Earth marine networks and how their work will help achieve SDG14. Hosted at the French Embassy in Portugal and streamed online.



- ▶ **Future Earth engaged in various activities at COP27**, in in Sharm-el-Sheikh, Egypt in November 2022.

- The Future Earth delegation consisted of 11 delegates (7 during the first week of COP27 and 5 during the second week) from the Secretariat and the GRNs (Ocean KAN, SOLAS, iLEAPs, and Health KAN)
- The **10 New Insights in Climate Science** report was launched at the COP in a press conference with the UNFCCC Executive Secretary, Simon Stiell.
- GCP's **Global Carbon Budget 2022** was launched at COP; various side events, webinar and pavilion events were held to engage with diverse stakeholders.
- **Poster contributions** from the Global Research Networks AIMES and IMBeR at Earth Information Day which took place at COP27 as part of the SBSTA session.
- **Side event at UNFCCC COP27** on “wildfire increase, a challenge for Earth system and societies” in collaboration with Colorado State University. The event aimed at discussing the occurrence of wildfires and their effects from both a natural and a social science perspective, and included contributions from SOLAS, iLEAPS, PAGES, BRIDGES, and FireMIP.
- Future Earth also presented some of its major work and initiatives at an exhibition booth. Members from our **South Asia Hub** were at the booth, connecting with delegates and participants from inside and outside our network.
- Representatives from the Earth Commission and staff from the Future Earth Secretariat participated in the Nature Pavilion, in collaboration with the Global Commons Alliance, in particular to highlight the interconnectedness of climate and nature.



- ▶ Future Earth successfully nominated 5 experts to participate in the IPBES coming assessment:
 - Nexus assessment (2 lead authors, 1 coordinating lead author, 1 review editor)
 - Transformative change assessment (1 lead author)
 - Scoping of the methodological assessment of business and biodiversity (1 advisor)
- ▶ Coordination of the Future Earth community engagement at the Convention of Biological Diversity (CBD) SBSTTA and the post-2020 Global Biodiversity Framework workshop in Nairobi (June 2022).
- ▶ Future Earth in collaboration with Sustainability in the Digital Age contributed two science policy briefs on deploying digital innovations in a safe and inclusive manner to accelerate efforts towards the Sustainable Development Goals (SDGs). The first was a contribution to the UN Office of the Secretary General's Envoy on Technology [consultation on a Global Digital Compact](#) and the second was an invited [brief](#) and [video](#) submitted to the [United Nations 8th Forum on Science, Technology and Innovation for the SDGs](#).
- ▶ Coordination of the overall participation of Future Earth to the fifteenth COP of the CBD (3-19 December, Montreal, Canada) with support from the Canada Hub.
 - A total of 19 delegates stemming from GRNs and the Secretariat have been nominated to participate in the COP and related meetings, including the open-ended Working Group on the Post-2020 Global Biodiversity Framework.



- Future Earth had an exhibition booth for the entire duration of the COP showcasing the biodiversity activities within Future Earth, which was co-organised with GMBA, Natural Assets KAN, bioDISCOVERY, and ICIMOD. This was complemented by a dedicated webpage with Future Earth's work on biodiversity and a social media push promoting Future Earth related events and activities at COP. There was also a statement made at the High-Level Segment on behalf of the Future Earth community.



- There was also a statement made at the High-Level Segment on behalf of the Future Earth community.
- Earth Commission members presented at COP15, in collaboration with the Future Earth secretariat, Global Commons Alliance and members from BioDISCOVERY. The focus of the presentation was on preliminary results on Earth system boundaries for the biosphere, science-based targets for nature and the just transformations needed for a “people and nature positive” future. Future Earth experts, including Earth Commissioners, **joined a statement signed by thousands of biodiversity scientists** to COP15 negotiators urging that the 2030 deadline not be abandoned.

- ▶ Launched in the fall of 2021, the Earth Commission has co-led a **novel tipping elements discussion series** in co-partnership with AIMEs, Future Earth secretariat and World Climate Research Programme. The events support efforts to develop a joint research agenda, design joint experiments and ideas for a unique Tipping Elements Modeling Intercomparison Project amongst the scientific community. During the period April 2022 to March 2023, nine webinars were held - many of them attracting hundreds of participants each.
- ▶ In March, members of the Future Earth Community attended the 58th IPCC meeting at which the Synthesis Report of the 6th Assessment Cycle was approved.

- ▶ **Future Earth at the UN Water Conference:**
In March 2023, Future Earth actively contributed to the UN Water Conference by sending a delegation, and participating in side events. A joint statement was submitted by members of the Earth Commission and Sustainable Water Futures.



Credit: UN Photo/Rick Bajornas

Alongside these efforts, the Future Earth Secretariat worked with representatives from all these international processes to ensure visibility of the community, and participation in future events and works, such as the UN Decade on Ocean Science, the Convention on Biological Diversity COP15 and UNFCCC COP27.



Sustainability in the Digital Age

Humanity is interconnected through and dependent on the digital and natural worlds. Tackling the UN Sustainable Development Goals, while working towards a just digital future, are intertwined ventures. Sustainability in the Digital Age works to build a global network of collaborators at this nexus, to drive the transformative systems changes needed to build a sustainable, climate-safe, and equitable world.

Key highlights in 2022-2023 include the following:

Data Driven Insights for Sustainable Agriculture (DISA):

This new initiative is working with partners in Rwanda to encourage the adoption of nature-based solutions that restore soil and increase productivity, while building evidence-based models of the food production systems across the region. In partnership with Leapr Labs Rwanda, Mila-Quebec AI Institute, Planet, and Future Earth Canada, the project aims to use technology like satellite imagery, artificial intelligence and machine learning to pinpoint and quantify indicators of interest for soils and landscapes that are resilient to climate shocks. This data can then be transformed into ready-to-use insights to inform decision making on the viability of regenerative agriculture and scaling sustainable healthy foods for all.

Coalition for Digital Environmental Sustainability (CODES):

CODES is a multi-stakeholder community of change makers and practitioners that seek to collaborate in accelerating a digital planet for sustainability. It is co-championed by UNEP, UNDP, the International Science Council, the German Environment Agency, the Kenyan Ministry of Environment and Forestry, Future Earth, and Sustainability in the Digital Age. The Action Plan for a Sustainable Planet in the Digital Age is CODES' flagship publication, launched in 2022 with our help. The plan calls for **3 systemic shifts (Enable Alignment; Mitigate Negative Impact; Accelerate Innovation)** and proposes 9 measurable global Impact Initiatives to inspire and provoke collective action, to progress the three shifts.

Sustainability in the Digital Age (SDA) continues to participate in the **Leadership in Environmental and Digital innovation for Sustainability (LEADS)** graduate training program, in partnership with the four main universities in Montreal, Canada. Several LEADS interns were hosted by SDA and the Future Earth Canada Hub over the reporting period, along with leadership and summer school activities.

Equitable Futures for Nature-based Solutions: Nature-based Solutions (NbS) are actions that protect, manage, and restore ecosystems, while addressing societal challenges like climate change, so there is a simultaneous benefit to nature and people. Building on work we did in 2021 with Microsoft, to convene over 100 participants on the theme of equitable NbS, in 2022 our team began a research program to 1) quantify the contribution of Canada's Indigenous Guardians program in conserving carbon stocks and biodiversity across terrestrial ecosystems 2) develop an AI algorithm protocol to monitor carbon, biodiversity, water quality, and co-benefits in various eco-zones, and 3) Survey and map NbS projects currently occurring in Canada (both Indigenous and non-Indigenous led).

Sustainability Research and Innovation Congress



The Sustainability Research and Innovation (SRI) Congress - a collaboration between Future Earth and the Belmont Forum - is now in its third edition. The Congress, which has rapidly become the leading annual transdisciplinary convening for the global sustainability science community, brings together a diversity of perspectives and experiences in an effort to accelerate a global transformation to sustainability.



SRI2022 took place in Pretoria, South Africa, and convened over 1600 participants from all parts the world and from all career stages around a diverse program that doubled in size from the previous year. SRI2022 included over 200 sessions and two satellite events: a hybrid event in Oceania and an online event in Asia, organized by Future Earth staff and community members. All SRI2022 sessions were recorded and made open access after the Congress. The 2022 Congress also involved 900 speakers and 20 sponsors, ranging from intergovernmental and civil society organizations to universities and private enterprises. SRI2022 participation scholarships for low and middle-income country participants significantly increased the

inclusivity and accessibility of the Congress, which was popular: onsite tickets for SRI2022 were sold out weeks before the event.

By March 2023, the preparations were in full swing for SRI2023 in Panama City, Panama in June 2023. SRI2023 was to become the first fully bilingual SRI Congress and the first to receive significant local and regional media attention as well as high-level government participation. At that time, the program of SRI2023 was also already being developed, which again increased by 100 activities. The SRI team is working with the future hosts of SRI2024 and SRI2025 to further grow and improve the experience and impact of the Congress.



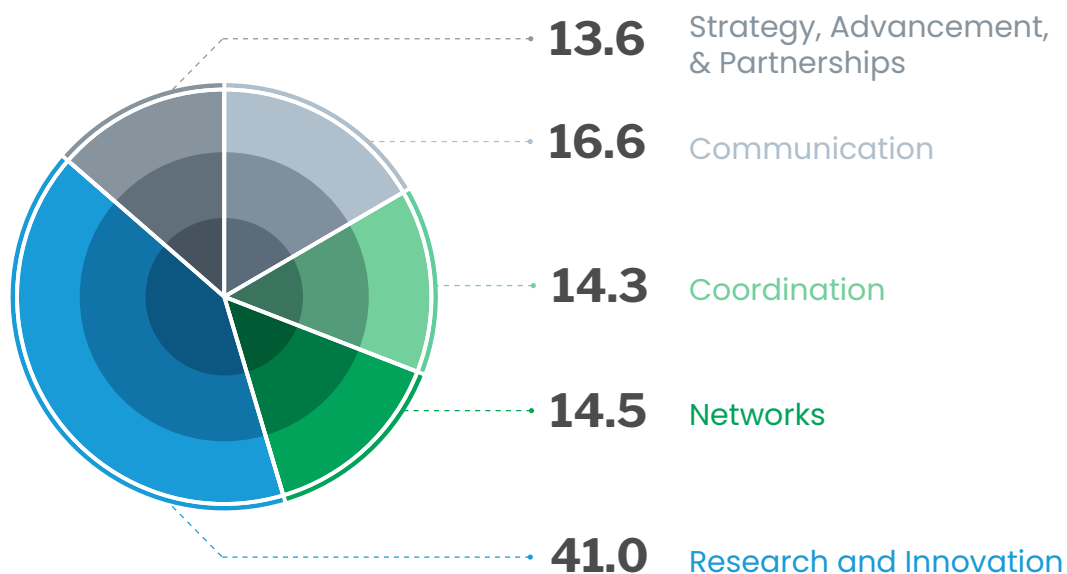


**Operations and
Governance**

Financial Summary

For the fiscal year April 2022 - March 2023, Future Earth's consolidated budget increased by 10% from the previous year to 7.7 million Euros. Support for Future Earth activities consists of 60% public and 40% private sector funding.

Expenses by Function	million EUR	%
Communications	€1.3	16.6%
Coordination	€1.1	14.3%
Networks	€1.1	14.5%
Research & Innovation	€3.2	41.0%
Strategy, Advancement, & Partnerships	€1.0	13.6%
Grand Total	€7.7	100.0%



Governing Council (March 2023)

Group	Name	Location
Early Career Researchers (ECR)	Gaby Langendijk	Germany
	Arijit Paul	Austria
	Giovanni Avila-Flores	Mexico
Experts from Low and Middle Income Countries (LMIC)	Gete Zeleke	Ethiopia
	Kalpana Chaudhari	India
	Lucas Enrico	Argentina
Global Research Networks (GRN)	Lisa Miller	Canada
	Sirkku Juhola (co-chair)	Finland
	Faten Attig Bahar	Tunisia
Global Secretariat Hubs Boards and Funders	Deliang Chen	Sweden
	Maria Uhle (co-chair)	USA
	Jean-Marie Flaud	France
	Yukari Takamura	Japan
	Gordon McBean	Canada
National, Local, and Regional Structures	Hanna Lappalainen	Finland
	Stephanie Burton	South Africa
	Taikan Oki	Japan

Future Earth Assembly (March 2023)

Name	Location
Early Career Researchers (ECR)	
Glenn Fernandez	China
Meng Wang	China
Jay Dean Pockling	United States
Sally Torres	Peru
Erna Karalija	Bosnia and Herzegovina
Ajibola Akanji	Nigeria
Rachel Kelly	Australia
Kabir Rasouli	Canada
Mais Aljunaidy	Turkey
Aakriti Srivastava	India
Regional Committee/Entity	
Jane Olwoch	Namibia
Belinda Reyers	South Africa
Manfred Lange	Cyprus
Riyad Y. Hamzah	Bahrain
Chrispin Kowenje	Kenya
Allali Abedlkader	Morocco
Jaanaki Gooneratne	Sri Lanka
Kanupriya Harish	India
Mohd Nordin Bin Hassan	Malaysia
Hein Mallee	Japan

Name	Location
National or Local Committee/Structure	
Battogtok Dorjgotov	Mongolia
Suvdantsetseg Balt	Mongolia
Diarmuid Torney	Ireland
Mary Dobbs	Ireland
Wolfgang Cramer	France
Thierry Lebel	India
Vandana Prasad	India
Lourdes J. Cruz	Philippines
Rico C. Ancog	Philippines
Philip Lewis	United Kingdom
Melissa Leach	United Kingdom
Luis Santamaria	Spain
Emilio Casamayor	Spain
Daniela Jacob	Germany
Sebastian Sonntag	Germany
Taro Yamauchi	Japan
Nobuko Saigusa	Japan
Candice Lung	Taipei
Hsin-Tien Lin	Taipei
Wenjie Dong	China
Bojie Fu	China
Vladimir Kolosov	Russian Federation
Evgeny Gordov	Russian Federation
Petra Lundgren	Australia
Juan Salazar	Australia

Name	Location
National or Local Committee/Structure (cont.)	
Gabriela Wuelser	Switzerland
Peter Edwards	Switzerland
Kaisa Korhonen-Kurki	Finland
Soonchang Yoon	South Korea
Joon Kim	South Korea
Margreth Keiler	Austria
Coleen Vogel	South Africa
Neville Sweijd	South Africa
Kuaanan Techato	Thailand
Siwatt Pongpiachan	Thailand

Global Secretariat Hub Boards or Funders	
Rémi Quirion	Canada
Gordon McBean	Canada
Olivier Dangles	France
Stéphane Blanc	France
Marie Stenseke	Sweden
Stefan Claesson	Sweden
Lisa Vaughan	United States
Makoto Taniguchi	Japan
Chiho Watanbe	Japan
Lin Yin	China
Tianjun Zhou	China
Yue-Gau Chen	Taipei
Tzu-Ching Meng	Taipei
Aldo Stroebel	South Africa
Basnett Smriti	India

Name	Location
Global Research Networks (GRNs)	
Hannah Liddy	United States
Mark Rounsevell	Germany
Cornelia Krug	Switzerland
Lynne Shannon	South Africa
James Patterson	Netherlands
Ella Vázquez-Domínguez	Mexico
Sibylle Schroer	Germany
Tim Smith	Australia
Xiuzhen Li	China
Ariane de Bremond	Switzerland
Sharachchandra Lele	India
Davnah Urbach	Switzerland
Eva Spehn	Switzerland
Clare Murphy	Australia
Langley DeWitt	United States
Ruth Morgan	Australia
Thomas McGovern	United States
Benjamin Poulter	United States
Semeena Valiyaveetil Shamsudheen	United Kingdom
Diana Ruiz Pino	France
John Claydon	Canada
Qian Ye	China
Peijun Shi	China
Jayes Srinivasan	India
Jiaguo Qi	United States
Chadia Wannous	France
Paula Ribeiro Prist	United States

Name	Location
Global Research Networks (GRNs) (cont.)	
Marie-France Loutre	Switzerland
Maria Eugenia Ferrero	Argentina
Maike Hamann	South Africa
Dr Odirilwe Selomane	South Africa
Li Li	China
Minhan Dai	China
Anik Bhaduri	Australia
Rabi Mohtar	Lebanon
Maurie Cohen	United States
Charlotte Jensen	Denmark
Anna Zivian	United States
Linwood Pendleton	France
Kristie Ebi	United States
Anthony Capon	Australia
Paul Hudson	United Kingdom
Masachika Suzuki	Japan
Zeenat Niazi	India
Taibat Lawanson	Nigeria
Jo-Ting Huang-Lachman	Germany
Jana Sillmann	Germany
Chrisy Laspidou	Greece
Marja Spierenburg	Netherlands
Unai Pascual	Spain
Maria Jose Marti-nez-Harms	Chile
Pep Canadell	Australia
Peraphan Jittrapirom	Netherlands

Name	Location
Low and Middle Income Country (LMIC)	
Najet Aroua	Algeria
Jurgenne H. Primavera	Philippines
Filipo Zulu	Zambia
Yulia Sugandi	Indonesia
Sylvia Mitchell	Jamaica
Eduardo Erazo Acosta	Colombia
Leopoldo Cavaleri Gerhardinger	Brazil
Joeli Veitayaki	Fiji
Partner	
Jon Padgham	United States
Carolina Adler	Switzerland
Detlef Stammer	Switzerland
Susanne Mecklenburg	United Kingdom
Kanji Fujiki	Japan
Shen Xiaomeng	Germany
Abdalah Mokssit	Switzerland
Custodian	
Salvatore Aricò	France
Nicole Arbour	Uruguay
Meriem Bouamrane	France
Andrea Hinwood	Kenya

Global Secretariat Staff

Canada

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- Jennifer Garard, *Deputy Director*
- Andréa Ventimiglia, *Advancements Officer*
- Marie d'Acremont, *Coordinator*
- Nilufar Sabet-Kassouf, *Strategic Programs Manager*
- Nilushi Kumarasinghe, *Research Associate*
- Rachelle Fox, *Digital Communications Officer*
- Santiago Ramírez Said, *Indigenous and Community Engagement Coordinator*
- Wendy Kuo, *Human Resources and Finance Manager*
- Wynona Acco-Barron, *Research Intern*
- Ilse Esparza Magana, *Research Assistant*
- Jordan Rosencranz, *Postdoctoral Researcher*
- Melisande Teng, *Research Assistant*

China

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- Xiao Lu, *Deputy Director*
- Debashis Nath, *Deputy Director*
- Biqi Ao, *Communications Officer*
- Zhenming Ji, *Science Officer*
- Jing Wei, *Science Officer*
- Shu Dong, *Administrative Officer*
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- Yaxing Du, *Science Officer*
- Zhongming Gao, *Science Officer*

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- Natalie Chong, *Science Officer*
- Rebecca Fenn, *Co-lead, Capacity & Networks*
- Claire Fréour, *Science Officer*
- Gilles Marciniak, *Deputy Director*
- Isabella Pellegrino, *Coordinator*

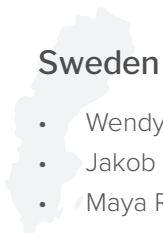
South Asia

- Satheesh SK, *Global Hub Director*
- Basnett Smriti, *Deputy Director*
- Adheesh Rao, *Senior Project Associate, Science Officer*
- Mamatha G, *Accounts*
- Pradeep, *Office Management*
- Rae-Anne Diengdoh Pyrtuh, *Scientific Administrative Assistant*
- Harshita Rathore, *Secretariat Support, Program Assistant*



Japan

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- Akira Sai, *Science Officer*
- Giles Sioen, *Research & Innovation Co-Lead*
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- Junya Tani, *Senior Adviser*
- Marcin Jarzebski, *Science Officer*
- Masami Oka, *Communications Officer*
- Noriko Kawata, *Communications Officer*
- Sikopo Nyambe, *Science Officer*
- Sunhee Suk, *Science Officer*
- Takako Okamoto, *Administration Officer*
- Xianping Luo, *Science Officer*
- Yuko Fujita, *Science Officer*
- Yuko Onishi, *Science Officer*
- Yuri Kojina, *Communications Officer*

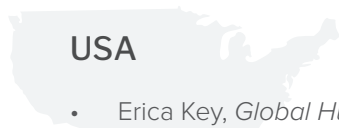


Sweden

- Wendy Broadgate, *Global Hub Director*
- Jakob Lundberg, *Deputy Director*
- Maya Rebermark, *Engagement Lead and Communications Director, Earth Commission*
- Daniel Ospina, *Science Officer*
- Lisa Jacobson, *Science Officer*
- Sophie Hebden, *Science Officer*
- Unn Rasmussen, *Head of Finance and Administration*
- Therese Öreteg, *Finance and Administrative Officer*
- Cecilia Andersson, *Coordinator & Administrative Officer*
- Susanna Dobrota, *Coordinator & Administrative Officer (on leave)*
- Steven Lade, *Research Scientist, Earth Commission*
- Juan Rocha, *Research Scientist, Earth Commission*

Taipei

- Revital Shpangental, *Global Hub Director*
- Shih-Chun Candice Lung, *Executive Secretary of Future Earth Taipei*
- Shih-Yu Lee, *Deputy Director*
- Hsin-lin Sophie Su, *Science Officer, Research and Innovation*
- Yu-Chun Dolly Chung, *Science Officer, Capacity and Networks*
- Tzu-Hsun Anny Chang, *Program Assistant, Communication*



USA

- Erica Key, *Global Hub Director*
- Veera Mitzner, *Associate Director*
- Bridget Blake, *Communications Lead*
- Laurel Milliken, *Global Finance and Governance Lead*
- Maria Fernanda Enriquez-Szentkirályi, *Latin America and the Caribbean Regional Lead and Global Governance Administrator (through February 2023)*
- Makyba Charles-Ayinde, *Latin America and the Caribbean Regional Lead (beginning February 2023)*

- Judit Ungvari, *Research & Innovation Co-Lead*
- Kyoko Shiota MacAulay, *Network Manager*
- Stephan Useche, *Event Tech Manager*
- Kathy Kohm, Editor-In-Chief, *Anthropocene Magazine*
- Mark Harris, Managing Editor, *Anthropocene Magazine*
- Sam Hoisington, Marketing Lead, *Anthropocene Magazine*

Funders

Canada

- ClimateWorks Foundation
- Fonds de Recherche du Québec (FRQ)
- Microsoft
- MITACS
- Montréal International
- Natural Sciences and Engineering Research Council of Canada
- United Nations Environment Programme
- Ducks Unlimited
- TD Financial Group

China

- China Association for Science and Technology
- Sun Yat-sen University
- Southern Marine Science and Engineering Guangdong Laboratory (Zhuhai)
- Key Laboratory of Tropical Atmosphere-Ocean System, Ministry of Education
- The ISC Urban Health & Wellbeing programme

France

- Alliance Nationale pour la Recherche en Environnement (AllEnvi)
- Agence Nationale de la Recherche (ANR)
- Centre National de la Recherche Scientifique (CNRS)
- Ministère de l'Enseignement supérieur, de la Recherche et de l'Innovation (MESRI)
- Institut de Recherche pour le Développement (IRD)
- Sorbonne Université

South Asia

- Divecha Centre for Climate Change
- Ministry of Earth Sciences

Taipei

- Academia Sinica

Japan

- AEON Environmental Foundation
- Hokkaido University
- KAO Corporation
- Keio Research Institute at SFC
- Ministry of Education, Culture, Sports, Science and Technology (MEXT)
- Nagasaki University
- National Institute for Environmental Studies
- Remote Sensing Technology Center of Japan
- Research Institute for Humanity and Nature
- Saraya Co., Ltd.
- Science Council of Japan
- The University of Tokyo/Institute for Future Initiatives

Sweden

- European Space Agency
- Hewlett Foundation
- MAVA
- Oak Foundation
- Porticus Foundation
- The Global Environment Facility
- Herlin Foundation
- Gordon and Betty Moore Foundation
- Global Challenges Foundation
- Swedish Research Council, FORMAS
- Frontiers Research Foundation

USA

- Belmont Forum
- Cynthia and George Mitchell Foundation
- George Mason University
- Gordon and Betty Moore Foundation
- Knight Foundation - NewsMatch
- Long Now Foundation
- NASA
- University of Colorado Boulder
- US Global Change Research Program
- US National Science Foundation
- V Kann Rasmussen Foundation

National and Local Contributors

Austria (Federal Ministry for Science, Research & Economy)

Finland (Council of Finnish Academies)

India (Indian National Science Academy)

Japan (Ministry of Education, Culture, Sports, Science and Technology, MEXT)

Custodian Organizations and their collaborations with Future Earth



United Nations Educational, Cultural and Scientific Organization (UNESCO)

UNESCO attended the governing council meetings in its capacity of custodian institution. UNESCO contributed to the 2022 Sustainability Research and Innovation (SRI) Congress in South Africa through the sponsorship of a Plenary focused on AI and Sustainability along the theme “Different Ways of Knowing.” Dr. Doaa Abu Elyounes moderated the plenary and shared insights on UNESCO’s action on the implementation of the recommendation on the ethics of AI and its relevance to address environmental challenges.



UN Environment Programme (UNEP)

UNEP is a custodian organization of Future Earth and provides guidance and shares science needs. To help build visible bridges between science, data, and observations, modeling, and horizon scanning and foresight to community level engagement and action. UNEP’s focus is on climate change, biodiversity degradation and ecosystems, and on pollution. This is embedded in the UNEA mandate on UNEP’s new Medium-Term Strategy 2022-2025. Practically, UNEP engaged in SRI2022 in South Africa. UNEP is engaging the future Earth hub in Montreal on strategic foresight and engages with the other custodians, like ISC, on urgently needed scientific areas such as behavioral science and data uptake in decision processes.





International Science Council (ISC)

In 2022, amidst the continuation of the COVID-19 pandemic, the war in Ukraine, growing economic disparities, and record-breaking temperatures, the International Science Council continued to bring the world together through the power of science. The ISC also continued and built upon its relationship with Future Earth as a custodian organization. The ISC and Future Earth, together with other partners, continued to co-champion the Coalition for Digital Environmental Sustainability (CODES) throughout 2022. In June, the coalition launched the **Action Plan** for a Sustainable Planet in the Digital Age. Several members of the Future Earth community have been **appointed** ISC Fellows. The **Fellowship** is the highest honor awarded by ISC to those championing science for global public good. 2022 marked the 50th anniversary of the historical 1972 UN Summit, when a group of 2,200 scientists addressed the world with a plea for action. This time, the International Science Council, Future Earth and the Stockholm Environment Institute convened natural and social scientists and humanities scholars to modernize and extend the historical call on the eve of Stockholm+50 in a **new letter**. The ISC also supported the Sustainability Research and Innovation Congress 2022 through sponsorship, by organizing a panel discussion, and participating in a pre-Congress Inkundla.



Belmont Forum

2022 was a great year for collaboration between Future Earth and Belmont Forum. Together with Future Africa we delivered the second Sustainability, Research and Innovation Congress (SRI2022) in Pretoria, South Africa and work was well underway on SRI2023 in Panama City. Both of the Belmont Forum collaborative research actions (CRAs) launched in 2022, originated as ideas at Future Earth (Systems for Sustainable Consumption and Production (SSCP2022) and Integrated Approaches to Human Migration/Mobility in an Era of Rapid Global Change (Migration 2022)). The Future Earth US Hub continues to contribute directly to the Migration CRA, working with Global Development Network (GDN) to provide network development activities, and providing funds to researchers from several low and middle income countries to participate. The Future Earth community continues to actively participate and contribute to Belmont Forum scoping activities, across a wide range of themes. The Future Earth Africa Hub is actively involved in the development of the upcoming Africa Regional CRA and working with colleagues at the Paris Hub, Belmont Forum shared the Pathways Postdoc Grants with relevant communities in our networks - working together to support shared goals. At the Belmont Forum Plenary in October 2022, the Future Earth US Hub presented Environmental Peacebuilding as a potential future CRA, which was accepted by the Membership to be taken into the scoping process. The collaboration will continue as we take these and future opportunities to develop our shared communities forward.

Partner Organizations and their collaborations with Future Earth



START International

START is a contributing partner to the US National Science Foundation funded project called the Transdisciplinary Training Collaboratory: Building Common Ground, led by Future Earth's Earth Leadership Program. The project is intended to identify the knowledge and approaches that researchers and practitioners engaging in transdisciplinary research need to know to be effective, and to develop training materials that are credible and useful for imparting this information to as broad an audience as possible.



Mountain Research Initiative (MRI)

As an active member of Future Earth, the Mountain Research Initiative (MRI) embraces the opportunity to advance mountain research within a broader community that shares a common history and expands scientific knowledge. In 2022, the MRI began collaborating with Future Earth's iLEAPS network to prepare for a workshop on "Advancing Essential Mountain Climate Variables" to be held in 2023. MRI's members, including the Governing Body, consistently contribute their expertise to and collaborate with Future Earth's Global Research Networks, promoting mountains in wider scientific discussions. They also underscored the significance of mountains on the global climate and policy agendas, providing valuable inputs at events such as the International Mountain Conference, IPCC AR6 outreach events, UNFCCC COP 27, and CBD COP 15. With a commitment to a more sustainable planet, MRI eagerly looks forward to future collaborations with Future Earth.



World Climate Research Programme (WCRP)

The World Climate Research Programme (WCRP) works in partnership with Future Earth on a range of activities aimed at improving our understanding of the coupled climate system. This collaboration is at all levels - within our science activities, at the science-policy interface, and on the world stage at meetings such as the annual UNFCCC Conference of the Parties (COP), where WCRP joined with Future Earth to launch 10 New Insights in Climate Science 2022. WCRP's Core Projects and Lighthouse Activities were very active over the last year and three new WCRP Task Teams were formed to initialize work on climate intervention, on linking carbon, energy and water cycles, and on an international Global Precipitation Experiment (GPEx). Supporting links between science and society, the WCRP's Regional Information for Society Core Project developed its first science plan, and the 'My Climate Risk' Lighthouse Activity established eight regional hubs, ensuring a 'bottom up' approach to regional climate risk. Preparations for the WCRP Open Science Conference in Rwanda in October 2023 was a major focus of the last year and we thank Future Earth for their strong partnership in co-designing the conference and for contributing many side events and to the science sessions. We hope to see many from the Future Earth community in Kigali!



Science and Technology in Society (STS) Forum

Science and technology provides us with great benefits such as economic growth and better quality of life, but, in parallel, it produces concerns and challenges, such as global climate change, and ethical problems in life sciences. STS forum is an international platform to discuss these "Lights and Shadows of Science and Technology" from a long-term perspective for the future of humankind among not only scientists but also policymakers and business leaders from all around the world. Many themes relevant to Future Earth such as sustainability, climate change, net-zero emissions, biodiversity, food and water security have been discussed there. In addition, as an important adjunct meeting, the Regional Action on Climate Change (RACC) symposium is held annually. We sincerely appreciate many members of Future Earth for their participation and great contribution to STS forum and RACC. STS forum will make continuous efforts to collaborate with Future Earth.



United Nations University (UNU)

The mission of the United Nations University is to ensure human survival and development. Our work contributes to tackling the challenges of climate change and biodiversity loss with research on nature-based solutions and human wellbeing within planetary boundaries, in line with Future Earth's ambition. In the coming years, we aim to synergize research and community-based activities with Future Earth in order to create a future which serves all humans on earth.



European Space Agency (ESA)

Find details about the European Space Agency's collaboration with Future Earth on page 40.

Select Publications

Future Earth-wide integrative publications :

10 New Insights in Climate Science

Future Earth, The Earth League, WCRP (2022). *10 New Insights in Climate Science 2022*. Stockholm. <https://doi.org/10.5281/zenodo.7228925>

Martin, M.A., et al. 2022. Ten new insights in climate science 2022. *Global Sustainability* 5, e20.

Earth Commission

Armstrong McKay, D.I., et al. 2022. Exceeding 1.5°C global warming could trigger multiple climate tipping points. *Science* 377, eabn7950.

Bai, X., et al. 2022. How to stop cities and companies causing planetary harm. *Nature* 609, 463–466.

Gupta, J., et al. 2023. Earth system justice needed to identify and live within Earth system boundaries. *Nature Sustainability* 1–9.

Obura, D.O., et al. 2023. Achieving a nature- and people-positive future. *One Earth* 6, 105–117.

Rammelt, C.F., et al. 2022. Impacts of meeting minimum access on critical earth systems amidst the Great Inequality. *Nature Sustainability* 1–10.

For a full list of Future Earth community-led publications, visit [our website](#).